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Mammals of Iowa

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MAMMALS OF IOWA

BY

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INTRODUCTION

Revision of mammalian faunal occurrence in Iowa is the primary objective of this investigation. The work involves an interpretation of former lists, perusal of mammal literature, examination of available material and field observations. It is to be hoped that this investigation will eventually contribute towards an interest in conserving the mammals, towards recognition of the systematist's value and towards assistance to the specialists making detailed life history studies.

The preliminary work on this problem was commenced on October 1, 1936. A list of recent Iowa mammals was compiled from known distribution as offered by Miller (1924) and the various revisions in the North American Fauna series. Inclusions in this hypothetical list were then checked against a thorough perusal of the literature affecting Iowa mammals.

Determination of intra-state distribution and verification of questionable records made necessary the collection of representative specimens. During the course of the investigation, about 100 mammals suitable to identification were collected. The collections in which the included specimens repose are given mention in the text of the discussion. All of these specimens were examined by Dr. H. H. T. Jackson and A. H. Howell of the U. S. Biological Survey, and all final identifications are given on their authority. To facilitate further investigation and to verify doubtful records, an attempt was made to locate all

museum specimens of Iowa mammals. Such specimens were found to repose in the collection of the U. S. Biological Survey, American Museum of Natural History, Field Museum of Natural History, Milwaukee Public Museum, Museum of Natural History at the University of Minnesota and the Museum of Zoology at the University of Michigan. There are also a few specimens in the museums at Coe College and at the University of Iowa and in various private collections; however, most of these, being life-like mounts, are not suitable to accurate identification. Even when considered in the aggregate, specimens of Iowa mammals are entirely too few to permit presentation of complete distributional data.

This list includes not only the 56 mammals known to occur in Iowa today, but also those which have been exterminated through land use. Of the latter, the American Black Bear, Canada Otter, Rocky Mountain Cougar, Canada Lynx, Wildcat, American Elk and Plains Bison are known to have been represented. Others, such as the American Marten, Fisher, Common Wolverine, Swift Fox, Black Rat, Canada Porcupine and American Pronghorn are thought to have been present, but no suitable evidence for their occurrence has been uncovered. These mammals and a few which ought to occur in the state but for which no authentic proof is available are included in a hypothetical supplement. Ten forms which have appeared in former lists through misinterpretation of the known range or description are contained in a separate group accompanied by an explanation for their removal.

The nomenclature and systematic sequence are those presented in the "List of North American Recent Mammals, 1923," by Gerrit S. Miller, Jr., 1924, except where revision has been made. The common names are those created by H. E. Anthony in his "Field Book of North American Mammals," 1928. Each mammal is introduced by the common name. This is followed by the current scientific name and a brief synonymy. The synonymy commences with the publication of the original description and the type locality, and concludes with the names used by Allen (1871), Goding (1883), Osborn (1890), Van Hyning and Pellett (1910), Ruthven and Wood (1912), Stoner (1918), and Gabrielson (1921).

REVIEW OF THE LITERATURE

The review is limited chiefly to former lists of Iowa mammals; however, recognition is given the reports of early surveys enfolding occasional notes on natural history. The earliest of these is volume 59 of the "Jesuit Relations," monumental report of Marquette and Joliet. In 1673, these men passed along the eastern boundary of Iowa on the Mississippi River from the mouth of the Wisconsin River southward.

Lewis and Clark were the first to report on western Iowa, ascending the Missouri River in 1804 and returning by way of the same route in 1806. Thomas Say, member of Major Long's expedition, remained through the winter of 1819-1820 at Engineer Cantonment near the present town of Blair, in Washington County, Nebraska. Description of Say's

Canis nubilus, Canis latrans and Sorex parva = Cryptotis parva as contained in volume one of "Long's Expedition to the Rocky Mountains" is from specimens taken during the stay at Engineer Cantonment.

Several expeditions through Iowa were headed by Stephen Watts Kearny, officer in the United States Army. Kearny led an expedition from the vicinity of Council Bluffs to the junction of the Minnesota and Mississippi Rivers and southward on the Father of Waters to St. Louis. Brigadier-General Henry Atkinson accompanied Kearny on a two-year exploration of the Missouri River, starting from St. Louis in 1824. In 1835, Kearny made his last journey over Iowa. This time he went from Keokuk northwest to Boonesboro, northeast to Lake Pepin, Minnesota, and returned over the same route. The eighth number of volume 12 in the Palimpsest contains a summarization of Kearny's travels in Iowa by W. J. Peterson.

Prince Maximilian of Wied, preparator of the earliest list of Indiana mammals, passed up the Missouri River in 1833 and returned in 1834. Wied's "Travels in the Interior of North America" was translated from the German and published by the Arthur H. Clark Company of Cleveland, Ohio, in 1906.

Probably the first attempt at enumeration of Iowa mammals was made by Dr. Isaac Galland of Montrose, Lee County, in 1840. "Galland's Iowa Emigrant" appears to be a description of the natural resources of Iowa Territory. The mammals are discussed under the subheading, "Beasts." Since Dr. Galland settled at Montrose in 1827 and died there in 1858,

one may expect his writing to be reflective of Iowa. A reprint of Galland's book may be found in the Annals of Iowa (1921, pp. 481-509).

A review of John J. Audubon's visits to Iowa during his trip up the Missouri River in 1843 is given in volume four of the Annals of Iowa.

Dr. J. A. Allen (1871) wrote the first list of Iowa mammals. In 1867, Allen spent the months of July, August and September making scientific observations on the wildlife of Iowa. Short visits were paid Boonesboro, Boone County, and Denison, Crawford County, but the investigation was carried on largely in Dallas, Guthrie, Green, Carroll, Sac, Calhoun and Audubon counties. The 48 species listed by Allen are included from observations during the investigation or from known distribution. It is of significance that Allen fails to give recognition to Cynonomys ludovicianus ludovicianus, Martes pennanti pennanti, Martes americana americana, Gulo luscus, Spilogale interrupta, Lynx canadensis canadensis, Lepus townsendii campanius and Antilocapra americana americana. Allen's list remains as the most scientific preparation of its kind for Iowa mammals.

In 1882, Dr. W. F. Goding (1883) presented a list of the wild and domesticated mammals of Iowa at the meetings of the Iowa Agricultural Society. This work appears to have been based almost entirely upon interpretation of the literature, and is therefore a somewhat questionable reference.

The third list of Iowa mammals was offered by Dr. Herbert Osborn during the session of the Iowa Academy of Science in 1888. The paper

was published in the proceedings of that organization in 1890. Osborn (1890, p. 41) reveals that he was in knowledge of Goding's work, since he writes: "I must add that a very few of the species included in Dr. Goding's list seem to me extremely doubtful." The species bearing doubtful notation were: Martes pennanti pennanti, Condylura cristata, Gulo luscus, Peromyscus nuttali aureolus, Ochetodon humilis= Reithrodontomys h. humilis and Lepus callotis. "A Partial Catalogue of the Animals of Iowa" by Osborn was published by the Iowa Agricultural College in 1892. The mammals catalogued were, with some exceptions, supposed to have been represented by mounted specimens in the college museum. Evidence indicates that specimens were considered representative of Iowa mammals regardless of the locality record. A narrative dealing with the extinct and vanishing animals of the state is given by Osborn in the Annals of Iowa (1905).

The Proceedings of the Iowa Academy of Science for 1910 contain a catalogue of Iowa mammals prepared by Van Hyning and Pellett. These writers exhibit a lack of familiarity with the literature and fail to include reference to museum specimens. Of the 88 mammals presented in this list, 33 are given a hypothetical rating. This paper by Van Hyning and Pellett represents the last attempt to write a complete list of Iowa mammals.

An authentic record of the mammals of Clay and Palo Alto counties was prepared by Ruthven and Wood (1912). The record is based upon specimens collected in the vicinity from 1907 to 1912 and upon observations

made during the expedition of 1907. The specimens are contained in the Museum of Zoology at the University of Michigan.

"Rodents of Iowa," by Dayton Stoner (1918), provides valuable information on this large group of mammals. Helpful contributions are made by Spurrell (1917) for Sac County, by Gabrielson (1921) for Marshall County, and by Stephens (1922) for the lake region of Dickinson County.

Literature on the mammals of Iowa is not abundant. Perhaps it is because the mammals, with few exceptions, fail in appeal to the esthetic sense of man and are not subject to easy observation.

CLASSIFIED LIST

MAMMALS OF KNOWN RECENT OCCURRENCE

CLASS MAMMALIA

ORDER 1. MARSUPIALIA
Family Didelphiidae

Virginia Opossum, Didelphis virginiana virginiana Kerr.

ORDER 2. INSECTIVORA
Family Talpidae

Prairie Mole, Scalopus aquaticus machrinus (Rafinesque).

Missouri Valley Mole, Scalopus aquaticus machrinoides Jackson.

Family Soricidae

Masked Shrew, Sorex cinereus cinereus I. Geoffroy.

Hayden Shrew, Sorex cinereus haydeni (Baird).

Hoy Pigmy Shrew, Microsorex hoyi hoyi (Baird).

Little Short-tailed Shrew, Cryptotis parva (Say).

Large Short-tailed Shrew, Blarina brevicauda brevicauda (Say).

ORDER 3. CHIROPTERA
Family Vespertilionidae

Little Brown Bat, Myotis lucifugus lucifugus (Le Conte).

Trouessart's Bat, Myotis keenii septentrionalis (Trouessart).

Silver-haired Bat, Lasionycteris noctivagans (Le Conte).

Big Brown Bat, Eptesicus fuscus fuscus (Beauvois).

Northern Red Bat, Nycteris borealis borealis (Müller).

Hoary Bat, Nycteris cinerea (Beauvois).

Family Molossidae

Tacubaya Free-tailed Bat, Tadarida depressa (Ward).

ORDER 4. CARNIVORA
Family Ursidae

American Black Bear, Euarctos americanus americanus (Pallas).

Family Procyonidae

Eastern Raccoon, Procyon lotor lotor (Linnaeus).

Family Mustelidae

Bonaparte Weasel, Mustela cicognani cicognani Bonaparte.

Minnesota Weasel, Mustela longicauda spadix (Bangs).

Common Mink, Mustela vison mink (Peale and Beauvois).

Mississippi Valley Mink, Mustela vison letifera Hollister.

Canada Otter, Lutra canadensis canadensis (Schreber).

Prairie Spotted Skunk, Spilogale interrupta (Rafinesque).

Northern Plains Skunk, Mephitis hudsonica (Richardson).

Illinois Skunk, Mephitis mesomelas avia (Bangs).

Common Badger, Taxidea taxus taxus (Schreber).

Family Canidae

Northern Plains Red Fox, Vulpes regalis Merriam.

Wisconsin Gray Fox, Urocyon cinereoargenteus ocythous Bangs.

Northern Coyote, Canis latrans Say.

Timber Wolf, Canis nubilus Say.

Family Felidae

Rocky Mountain Cougar, Felis oregonensis hippolestes (Merriam).

Canada Lynx, Lynx canadensis canadensis Kerr.

Wildcat, Lynx rufus rufus (Schreber).

ORDER 5. RODENTIA

Family Sciuridae

Southern Woodchuck, Marmota monax monax (Linnaeus).

Thirteen-striped Ground Squirrel, Citellus tridecimlineatus tridecimlineatus (Mitchill).

Franklin Ground Squirrel, Citellus franklini (Sabine).

Gray Eastern Chipmunk, Tamias striatus griseus Mearns.

Southern Red Squirrel, Sciurus hudsonicus loquax Bangs.

Minnesota Red Squirrel, Sciurus hudsonicus minnesota Allen.

Northern Gray Squirrel, Sciurus carolinensis leucotis (Gapper).

Western Fox Squirrel, Sciurus niger rufiventer (Geoffroy).

Small Eastern Flying Squirrel, Glaucomys volans volans (Linnaeus).

Family Geomyidae

Shaw Pocket Gopher, Geomys bursarius (Shaw).

Family Heteromyidae

Dusky Pocket Mouse, Perognathus flavescens perniger Osgood.

Family Castoridae

Missouri River Beaver, Castor canadensis missouriensis Bailey.

Family Cricetidae

Short-eared Grasshopper Mouse, Onychomys leucogaster breviauritus Hollister.

Prairie Harvest Mouse, Reithrodontomys megalotis dychei (Allen).

Baird White-footed Mouse, Peromyscus maniculatus bairdi (Hoy and Kennicott).

Northern White-footed Mouse, Peromyscus leucopus noveboracensis (Fischer).

Goss Lemming Mouse, Synaptomys cooperi gossii (Coues).

Pennsylvania Meadow Mouse, Microtus pennsylvanicus pennsylvanicus (Ord).

Prairie Meadow Mouse, Microtus ochrogaster (Wagner).

Woodland Pine Mouse, Pitymys nemoralis (Bailey).

Common Muskrat, Ondatra zibethica zibethica (Linnaeus).

Great Plains Muskrat, Ondatra zibethica cinamomina (Hollister).

Family Muridae

House Mouse, Mus musculus musculus Linnaeus.

Norway Rat, Rattus norvegicus (Erxleben).

Family Zapodidae

Prairie Jumping Mouse, Zapus hudsonius campestris Preble.

ORDER 6. LAGOMORPHA
Family Leporidae

White-tailed Jack Rabbit, Lepus townsendii campanius Hollister.

Mearns Cottontail, Sylvilagus floridanus mearnsi (Allen).

ORDER 7. ARTIODACTYLA
Family Cervidae

American Elk, Cervus canadensis canadensis (Errleben).

Plains White-tailed Deer, Odocoileus virginianus macrourus (Rafinesque).

Family Bovidae

Plains Bison, Bison bison bison (Linnaeus).

MAMMALS OF HYPOTHETICAL OCCURRENCE

ORDER 3. CHIROPTERA
Family Vespertilionidae

Little Gray Bat, Myotis grisescens Howell.

Georgian Bat, Pipistrellus subflavus subflavus (F. Cuvier).

Rafinesque Bat, Nycticeius hymeralis (Rafinesque).

ORDER 4. CARNIVORA
Family Mustelidae

American Marten, Martes americana americana (Turton).

Fisher, Martes pennanti pennanti (Erxleben).

New York Weasel, Mustela noveboracensis noveboracensis (Emmons).

Common Wolverine, Gulo luscus (Linnaeus)

Long-tailed Texas Skunk, Mephitis mesomelas varians (Gray).

Family Canidae

Swift Fox, Vulpes velox velox (Say).

ORDER 5. RODENTIA
Family Sciuridae

Rufescent Woodchuck, Marmota monax rufescens Howell.

Southern Gray Squirrel, Sciurus carolinensis carolinensis Gmelin.

Family Castoridae

Canadian Beaver, Castor canadensis canadensis Kuhl.

Family Cricetidae

Little Gray Harvest Mouse, Reithrodontomys albescens griseus (Bailey).

Family Muridae

Black Rat, Rattus rattus rattus (Linnaeus).

Family Zapodidae

Hudson Bay Jumping Mouse, Zapus hudsonius hudsonius (Zimmermann).

Family Erethizontidae

Canada Porcupine, Erethizon dorsatum dorsatum (Linnaeus).

ORDER 7. ARTIODACTYLA

Family Antilocapridae

American Pronghorn, Antilocapra americana americana (Ord).

MISINTERPRETATIONS

ORDER 2. INSECTIVORA
Family Talpidae

Star-nosed Mole, Condylura cristata (Linnaeus).

ORDER 4. CARNIVORA
Family Canidae

Eastern Red Fox, Vulpes fulva (Desmarest).

ORDER 5. RODENTIA
Family Sciuridae

Black-tailed Prairie Dog, Cynomys ludovicianus ludovicianus (Ord).

Eastern Chipmunk, Tamias striatus striatus (Linnaeus).

Family Cricetidae

Southern Golden Mouse, Peromyscus nuttalli aureolus (Audubon and Bachman).

Bailey Wood Rat, Neotoma floridana baileyi (Merriam).

Drummond Meadow Mouse, Microtus drummondi (Audubon and Bachman).

ORDER 6. LAGOMORPHA
Family Leporidae

Minnesota Varying Hare, Lepus americanus phaeonotus Allen.

Wagler's Jack Rabbit, Lepus callotis Wagler.

Great Plains Jack Rabbit, Lepus californicus melanotis (Mearns).

ORDER 7. ARTIODACTYLA

Family Cervidae

Common Moose, Alces americana americana (Clinton).

THE MAMMALS OF IOWA

ORDER 1. MARSUPIALIA
Family Didelphiidae

VIRGINIA OPOSSUM

Didelphis virginiana virginiana Kerr

1792. Didelphis virginiana Kerr, Anim. Kingd., p. 193.
Type Locality: Virginia.

1871. Didelphys (sic) virginiana Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 194.

1883. Didelphys (sic) virginiana Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Diadelphys (sic) virginiana Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 44.

1910. Didelphis virginiana Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 212.

1912. Didelphis virginiana Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 203.

1921. Didelphis virginiana Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 147.

The Virginia Opossum, typically Carolinean, is a relatively new addition to the mammalian fauna of Iowa. It may be found along timbered watercourses throughout the state, somewhat common in the southern five tiers of counties and progressively less numerous toward the north. The northern limits of distribution have been extended most rapidly along the streams, especially those of the Mississippi and Missouri River

valleys. The species is still considered rare in the north central counties.

The opossum was probably present in Iowa long before the arrival of the first settlers. It was included in a discussion of the natural resources of the Territory of Iowa by Dr. Izaac Galland (1840), and early settlers in Sac County told of seeing them at Grant and Lee groves upon their arrival in 1854 (Spurrell, 1917). An intensive faunal investigation of Dallas, Guthrie, Boone, Greene, Carroll, Crawford, Sac, Calhoun, and Audubon counties, by Dr. J. A. Allen during the summer of 1867 failed to afford the opportunity of collecting or observing this species; however, it was listed, upon authentic report, as rare in southern Iowa (Allen, 1871). It is readily seen that Allen's investigation was carried out high on the watershed between the Missouri and Mississippi Rivers, and therefore on the remote end of the wooded avenues of approach along streams. Perhaps that is why the opossum did not appear in that region until a later date.

The species under discussion first appeared at Atlantic, Cass County, some time during the '90's, according to Frank C. Pellett (letter, 1936). Seton (1929, 4:870) quotes Senator Lafayette Young as stating in 1915: "Opossums are now common as far up as Des Moines. It first came about 10 years ago." Residents in the vicinity of Marshalltown were unfamiliar with this mammal in 1914 (Gabrielson, 1921). Spurrell (1917) tells of seeing two opossums taken in traps at Wall Lake, Sac County, in 1907, at which time they were just beginning to move out from the large streams.

It is listed for Clay County by Ruthven and Wood (1912) on an authentic record obtained for Gillett's Grove. This record indicates that the opossum was just appearing in the region by way of the Little Sioux River. Beyond the timbered lanes of our streams and their tributaries, the advance of the opossum has been retarded. Stephens (1922) gives the opossum only a hypothetical rating for Dickinson County. The writer has made two significant observations in relation to opossums in northern Iowa. Remains of an opossum were found in the stomach of a red fox taken at Ryan Lake, Emmet, County, during the 1936-1937 winter, and an opossum, victim of highway traffic, was seen on state highway 13, about two miles south of Elkader, Clayton County, on August 16, 1936.

ORDER 2. INSECTIVORA
Family Talpidae

PRAIRIE MOLE

Scalopus aquaticus machrinus (Rafinesque)

1832. *Talpa machrina* Rafinesque, Atlantic Journal, vol. 1, p. 61. Type Locality: Near Lexington, Fayette County, Kentucky.

1883. *Scalops argentatus* Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. *Scalops argentatus* Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. *Scalops aquaticus machrinus* Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

1921. *Scalopus aquaticus machrinus* Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 149.

The Prairie Mole is found wherever food and soil are suitable throughout eastern Iowa.

The original range of this mole in Iowa, according to a map by Jackson (1915), is everywhere east of a line from Keokuk northwest along the Des Moines River to Knoxville and due north to Deercreek on the Iowa-Minnesota state line. This range may now be extended about 30 miles to the west. The old line marking the western limits for this mole in Iowa is changed only between Knoxville and Deercreek, where it reaches out to include Jewell, Hamilton County. This change is made on the basis of a specimen, No. 18a, taken at Jewell on March 8, 1936. Identification of this specimen was verified by H. H. T. Jackson of the U. S. Biological Survey. The specimen is now in the Iowa State College collection. Surber (1932) reports that machrinus has not been taken in Minnesota.

This subspecies is listed for Dickinson County by Stephens (1922) and for Sac County by Spurrell (1917). Both of these records are far beyond the known range and are not supported by specimens; hence, these records are misidentifications and undoubtedly refer to Jackson's S. a. machrinoides.

There are four specimens of this mole from Fairport, Muscatine County, in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation, (letter, 1936). George G. Goodwin, Assistant Curator, of the American Museum of Natural History, writes that there are seven specimens from Iowa City, Johnson County, in the museum collection (letter, 1936).

Published records of museum specimens: Marshall Co., Marshalltown,

Gabrielson (1921, 1, probably in the collection of the U. S. Biological Survey; Marion Co., Knoxville, Jackson (1915), 1, Field Museum of Natural History; Henry Co., Hillsboro, Jackson (1915), 1, collection of the U. S. Biological Survey.

Specimens examined:

Hamilton County, Jewell, No. 18a, Iowa State College collection.

MISSOURI VALLEY MOLE

Scalopus aquaticus machrinoides Jackson

1914. Scalopus aquaticus machrinoides Jackson, Proc. Biol. Soc. Washington, vol. 27, p. 19.
Type Locality: Manhattan, Riley County, Kansas.

1871. Scalops argentatus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187. (Not Rafinesque).

1890. Scalops aquaticus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42. (Not Linnaeus).

The Missouri Valley Mole is found wherever food and soil are suitable throughout western Iowa.

The range of this subspecies in Iowa is everywhere west of a line almost due north and south from Missouri to Minnesota through Des Moines (Jackson, 1915). It has been reported east as far as the Mississippi River from both Minnesota (Surber, 1932) and Missouri (Jackson, 1915); hence, increased collection should give reason for extending the eastern limits of this mole's range in Iowa. No point of intergradation has been established within the state.

Allen (1871) lists Scalops argentatus = S. a. machrinus as well known but not numerous. The investigations of Dr. Allen were all well within the known range of the more recently described machrinoides. In addition to Scalops argentatus = S. a. machrinus, Osborn (1890) lists Scalops aquaticus = S. a. aquaticus which is definitely a misidentification. It is possible that Osborn noticed a difference in Iowa moles and made reference to the only descriptions available at the time, in which case the reference may be considered a misidentification of machrinoides. Osborn appears to have considered this record a mistake, for it is not contained in a second list (Osborn, 1892). No explanation for this omission in the second list is given.

Published records of museum specimens: Pottawattamie Co., Council Bluffs, Jackson (1915), 1, collection of the U. S. Biological Survey.

Specimens examined:

Story County, Ames, No. 22a, Iowa State College collection.

Family Soricidae

MASKED SHREW

Sorex cinereus cinereus I. Geoffroy.

1792. Sorex arcticus cinereus Kerr, Animal Kingdom, p. 206.
Type Locality: Fort Severn, Ontario, Canada.

1871. Sorex cooperi Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187.

1883. Sorex cooperi Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Sorex cooperi Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Sorex personatus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

The Masked Shrew is common in moist habitats supporting rank vegetative growth throughout northeast Iowa. The known range for this shrew in Iowa, as interpreted from a map by Jackson (1929), appears to include Mitchell, Howard, Winneshiek, Allamakee, Floyd, Chickasaw, Fayette, Clayton, Bremer, Black Hawk, Buchanan, Delaware and Dubuque counties. Nothing has been uncovered to provide reason for material alteration of the ascertained range. It may be assumed that the range extends westward to Hamilton County, on grounds of a specimen, No. 14a, taken on the edge of a marsh at Jewell. The specimen is referable to S. c. haydeni but exhibits a tendency to approach S. c. cinereus. The identification was verified by Dr. H. H. T. Jackson.

Sorex cooperi = S. c. cinereus was listed for Iowa on known distribution by Allen (1871). Osborn (1890) offers the notation, "fairly common;" Stephens (1922) includes Sorex personatus = S. c. cinereus on hypothetical grounds for the lake regions in Dickinson County. The reference is assumed to be a misidentification of Baird's haydeni.

Published records of museum specimens: Buchanan Co., Jackson (1928), 2, collection of the U. S. Biological Survey.

HAYDEN SHREW

Sorex cinereus haydeni (Baird).

1857. Sorex haydeni Baird, Report Pacific R. R. Survey 8: part 1, Mammals, p. 29.
Type Locality: Fort Union, Nebraska (later Fort Buford, now Mondak, Mont., near Buford, Williams County, N. Dak.).

The Hayden Shrew is common in moist areas supporting rank growths of vegetation throughout northwest Iowa.

The known distribution, interpreted from a map by Jackson (1928), apparently includes Lyon, Osceola, Dickinson, Sioux, O'Brien, Clay, Plymouth, Cherokee, Buena Vista, Woodbury, Ida and Sac counties. Specimens taken during this investigation provide reason for extending the range of this subspecies in Iowa. A specimen, No. 2a, was collected at Arnold's Park, Dickinson County, and two more, No. 7a and No. 14a, were taken in a Scirpus-Typha associes at Jewell, Hamilton County. These new records permit the original range in Iowa to be extended eastward to a line drawn from Spirit Lake, Dickinson County, southeastward to Jewell, Hamilton County, and thence due west through Wall Lake, Sac County, to the Missouri River. It may be assumed that the true margin of this shrew's present range is located near Jewell, Hamilton County. This assumption is based on a specimen, No. 14a, which has been mentioned before as showing an approach to S. c. cinereus. According to Jackson (1928, p. 52) such a characteristic might serve to indicate the margin of the range, since he writes: "It is a rather variable form particularly in cranial characters, which show everywhere in a broad border along its range an approach toward S. c. cinereus."

The first record of this shrew in Iowa is given by Spurrell (1917) for Sac County. The specimens mentioned by Spurrell are recorded by Jackson (1928).

Published records of museum specimens: Sac Co., Wall Lake, 1, and Sac City, 1, Jackson (1928), collection of the U. S. Biological Survey.

Specimens examined:

Hamilton County, Jewell; Nos. 7a and 14a; Iowa State College collection.

Dickinson County, Arnold's Park; No. 2a; Iowa State College collection.

HOY PIGMY SHREW

Microsorex hoyi hoyi (Baird)

1857. Sorex hoyi Baird, Report Pacific R. R. Survey, vol. 8, part 1, Mammals, p. 32.
Type Locality: Racine, Racine County, Wisconsin.

The probable range of the Hoy Pigmy Shrew in Iowa, according to a map presented by Jackson (1928), is over northeast Iowa, north of a line drawn from the vicinity of Dubuque northwestward to Spirit Lake. Jackson had no specimens from Iowa, but assumed that the range passed through this part of Iowa from specimens taken in Minnesota, South Dakota and Wisconsin.

Specimen, No. 21a, representing the first record of this shrew for Iowa, was taken at Clear Lake, Cerro Gordo County, during these investigations. The specimen was referred to this subspecies by Dr. H. H. T.

Jackson.

Specimens examined:

Cerro Gordo County, Clear Lake; No. 21a; Iowa State College collection.

LITTLE SHORT-TAILED SHREW

Cryptotis parva (Say).

1823. Sorex parvus Say, Long's Exped. Rocky Mts., vol. 1, p. 163. Type Locality: West bank of Missouri River, near Blair, Washington County, Nebraska.

1883. Blarina exilipes Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Blarina exilipes Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Blarina parva Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

1921. Cryptotis parva parva (sic) Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 149.

The Little Short-tailed Shrew is found throughout Iowa. The known range, as given by Miller (1924), includes all Iowa. This species has been included on state lists by Goding (1883), Osborn (1890 and 1892), and Van Hyning and Pellett (1910). Van Hyning and Pellett (1910, p. 215) offer the following notation: "Common over the state."

It is recorded for Marshall County by Gabrielson (1921) and for Sac County by Spurrell (1917). The writer has examined specimens from Marion and Story counties, both of which were too badly crushed to permit preparation.

There are two specimens of this shrew from Fairport, Muscatine County, in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation (letter, 1936).

LARGE SHORT-TAILED SHREW

Blarina brevicauda brevicauda (Say).

1823. Sorex brevicaudus Say, Long's Exped. Rocky Mts., vol. 1, p. 164. Type Locality: West bank of Missouri River, near Blair, Washington County, Nebraska.

1871. Blarina brevicauda Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187.

1883. Blarina brevicauda Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Blarina brevicauda Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Blarina brevicauda Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

1921. Blarina brevicauda brevicauda Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 149.

The Large Short-tailed Shrew is found throughout all Iowa, more numerous in the wooded parts than in the open fields.

The writer has chosen to follow Anthony (1928), Surber (1932) and others in considering Gapper's subspecies talpoides as indistinguishable from brevicauda.

There are three specimens of this shrew from Fairport, Muscatine County, in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation (letter, 1936).

One specimen from Iowa City, Johnson County, is contained in the American Museum of Natural History (Goodwin, letter, 1936), and another from Knoxville, Marion County, is contained in the Field Museum of Natural History (Simms, letter, 1936).

Published records of museum specimens: Dickinson Co., Stephens (1922), 1, private collection; Pottawattamie Co., Council Bluffs, Merriam (1895), 8, collection of the U. S. Biological Survey; Marion Co., Knoxville, Merriam (1895), 2, collection of the U. S. Biological Survey.

Specimens examined:

Story County, Ames; Nos. 51a, 144, 121, and 135; Iowa State College collection.

Hamilton County, Jewell; Nos. 3a and 11a; Iowa State College collection.

ORDER 3. CHIROPTERA

Family Vespertilionidae

LITTLE BROWN BAT

Myotis lucifugus lucifugus (Le Conte)

1831. Vespertilio lucifugus Le Conte, McMurtrie's Cuvier, Animal Kingdom, vol. 1, p. 431.
Type Locality: Georgia.

1890. Vespertilio lucifugus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Myotis lucifugus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

The Little Brown Bat is found throughout all Iowa. Migratory habits

cause it to be irregularly numerous in a given locality from season to season.

Surber (1932) considers this subspecies as the most common bat in Minnesota. It is recorded for Nebraska as "Uncommon eastwardly" (Swenk, 1915, p. 854).

Authentic records have been made for National, Clayton County, by Sherman (1929) and for Dickinson County by Stephens (1922).

There is a specimen of this bat from Fairport, Muscatine County, in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation (letter, 1936).

TROUESSART'S BAT

Myotis keenii septentrionalis (Trouessart).

1897. Vespertilio gryphus var. septentrionalis Trouessart, Catal. Mamm. VIV. foss., p. 131, 1897.
Type Locality: Halifax, Nova Scotia

1871. Vespertilio subulatus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187. (Not Say).

1883. Vespertillio (sic) subulatus Goding, Iowa State Agr. Soc. (1882), p. 330. (Not Say).

1890. Vespertilio subulatus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42. (Not Say).

1910. Myotis subulatus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215. (Not Say).

The status of Trouessart's Bat is undetermined for Iowa. Lyon (1936, p. 65) writes that "Trouessart's Bat is distributed in eastern

North America from Newfoundland and Quebec, south to Tennessee and South Carolina, west to North Dakota and Arkansas."

In addition to inclusion by the writers recognized in the synonymy, this bat is listed by Osborn (1892). The latter record is supposed to have been supported by a specimen in the collection of the Iowa State College. The specimen cannot be found, and the value of the specimen as an Iowa record is somewhat doubtful (see p. 9). To the writer's knowledge, there are no authentic published records for museum specimens from Iowa.

Van Hyning and Pellett (1910) list this species as common throughout the state. It is considered "Of but local distribution in Minnesota,...." by Surber (1932, p. 45).

SILVER-HAIRED BAT

Lasionycteris noctivagans (Le Conte)

1831. V[espertilio] noctivagans Le Conte, McMurtrie's Cuvier, Animal Kingdom, vol. 1, p. 431.
Type Locality: Eastern United States.

1871. Scotophilus noctivagans Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187.

1883. Vespertillio noctivigans (sic) Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Vesperugo noctivigans (sic) Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Lasionycteris noctivagans Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

The Silver-Haired Bat occurs irregularly along the wooded streams in Iowa. It migrates southward upon the approach of autumn, and at that time may be seen flying during the day.

The known range is "North America north of Mexico, from the Atlantic to the Pacific; probably not breeding south of the transition zone" (Miller, 1924, p. 74). For Nebraska, Swenk (1915, p. 854) writes that the species is "Common over the state in migrations." It is believed to be widely distributed in Minnesota (Surber, 1932).

To the writer's knowledge, there are no authentic published records for museum specimens from Iowa.

BIG BROWN BAT

Eptesicus fuscus fuscus (Beauvois).

1796. Vespertilio fuscus Beauvois, Catal. Raisonne Mus. Peale, Philadelphia, p. 18.
Type Locality: Philadelphia, Pennsylvania.

1871. Scotophilus fuscus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187.

1890. Vesperugo serotina Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Vespertilio fuscus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

The Big Brown Bat is found throughout all Iowa. It has been observed at National, Clayton County, by Sherman (1929). Mr. Fred J. Pierce reports the species from Delaware County (letter, 1937).

George G. Goodwin, Assistant Curator, writes that a specimen of

this bat from Iowa City, Johnson County, is contained in the American Museum of Natural History (letter, 1936). Two specimens from Dubuque, Dubuque County, are to be found in the Field Museum of Natural History according to Director Simms (letter, 1936).

NORTHERN RED BAT

Lasiurus borealis borealis (Müller).

1776. Vespertilio borealis Müller, Natursyst. Suppl., p. 20. Type Locality: New York.

1871. Lasiurus noveboracensis Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187.

1890. Atalpha noveboracensis Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Lasiurus borealis Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

1921. Nycteris borealis borealis Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 149.

The Northern Red Bat is found throughout the timbered parts of Iowa. It is considered our most abundant bat by Osborn (1890). Swenk (1915, p. 854) notes that this species is "Common over the state, especially eastwardly" in Nebraska. It is almost as common as the Little Brown Bat in Minnesota (Surber, 1932).

Authentic records are at hand from Marshall County by Gabrielson (1921) and for Sac County by Spurrell (1917). There is a female with two young from Ames, Story County, on display in the Department of

Zoology and Entomology at Iowa State College.

Specimens examined:

Story County, Ames; 3; Iowa State College collection.

HOARY BAT

Lasiurus cinereus (Beauvois)

1796. Vespertilio cinereus (misspelled linereus) Beauvois, Catal. Raisonné Mus. Peale, Philadelphia, p. 18.
Type Locality: Philadelphia, Pennsylvania.

1871. Lasiurus cinereus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187.

1883. Vespertillio (sic) pruinosus Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Atalpha cinereus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Lasiurus cinereus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 216.

1912. Lasiurus cinereus Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 205.

The Hoary Bat is probably most common as a spring and fall migrant in Iowa. Swenk (1915, p. 854) considers this bat a "Very common migrant over the state." It is thought to be rare in Minnesota (Surber, 1932). The known range is: "Boreal North America from Atlantic to Pacific, breeding within the Boreal Zone, but in autumn and winter migrating at least to southern border of United States" (Miller, 1897, p. 112). The mounted specimen in the Iowa State College Museum was taken July 2, 1901.

Authentic records have been made for Palo Alto County by Ruthven and

Wood (1912), for Dickinson County by Stephens (1922), and for Sac County by Spurrell (1917).

Specimens examined:

Story County, Ames; 1; Iowa State College Museum.

Family Mollossidae

TACUBAYA FREE-TAILED BAT

Tadarida depressa (Ward)

1891. Nyctinomus depressus Ward, Amer. Nat., vol. 25, p. 747. Type Locality: Tacubaya, Federal District, Mexico.

1921. Nyctinomus depressus Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 149.

The Tacubaya Free-tailed Bat appears as a straggler in southern Iowa.

Published records of museum specimens: Marshall Co., Marshalltown, Gabrielson (1921), 1, Field Museum of Natural History (Simms, letter, 1936); Linn Co., Cedar Rapids, Cory (1912), 1, location of specimen not given.

ORDER 4. CARNIVORA
Family Ursidae

AMERICAN BLACK BEAR

Euarctos americanus americanus (Pallas).

1780. Ursus americanus Pallas, Spicilegia zoologica, fasc. 14, p. 5. Type Locality: Eastern North America.

1871. Ursus arctos Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 184.

1883. Ursus Americanus (sic) Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Ursus arctos Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Ursus americanus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 217.

The American Black Bear is extinct in Iowa. It was common throughout the wooded parts of the state until about 1850.

A bear was killed in the vicinity of the junction of Chequest Creek and the Des Moines River in 1838, according to Duffield (1903, p. 209), who writes: "Hanging near one of the tepees was the carcass of a large bear, the skin still on, and none of the meat seemed to have been taken out." In 1840 Galland (1921, p. 500) writes: "Bears are scarce, but the Indians succeed every winter in obtaining more or less of these animals, as appears from the skins which they bring to the traders." An early settler reported a bear for Sac County in 1855 (Spurrell, 1917).

Cory (1912) reports the bear to be extinct in Illinois and gives the latest record as that of a bear taken in Alexander County during the year 1860. The black bear is still somewhat common in Minnesota as far south as the central part of Pine County (Surber, 1932).

Family Procyonidae

EASTERN RACCOON

Procyon lotor lotor (Linnaeus).

1758. [*Ursus*] *lotor* Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 48.
Type Locality: Eastern United States.

1871. *Procyon lotor* Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 184.

1883. *Procyon lotor* Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. *Procyon lotor* Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. *Procyon lotor* Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 216.

1921. *Procyon lotor lotor* Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 149.

The Eastern Raccoon is found along the wooded streams throughout the state. This mammal is believed common; however, its numbers continue to be limited by the destruction of den trees.

Specimens examined:

"Iowa"; 3; Iowa State College Museum.

BONAPARTE WEASEL

Mustela cicognani cicognani Bonaparte

1838. *M*[*ustela*] *cigognanii* (sic) Bonaparte, Charlesworth's Mag. Nat. Hist., vol. 2, p. 37.
Type Locality: Northeastern North America.

1871. *Putorius vulgaris* Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 183.

1883. *Putorius pusillus* Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. *Putorius vulgaris* Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

The only authentic record of cicognani in Iowa is based on a specimen taken in the lake region of Dickinson County (Stephens, 1922). This specimen was referred to Mustela c. cicognani by Dr. H. H. T. Jackson.

MINNESOTA WEASEL

Mustela longicauda spadix (Bangs)

1896. Putorius longicauda spadix Bangs, Proc. Biol. Soc. Washington, vol. 10, p. 8.
Type Locality: Fort Snelling, Hennepin County, Minnesota.

1871. Putorius ermineus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 183.

1883. Putorius ermineus Coding, Iowa State Agr. Soc. (1882), p. 330.

1890. Putorius ermineus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Putorius longicauda Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 217.

1912. Putorius longicaudus (sic) Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 205.

1921. Putorius longicauda subsp. Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 149.

The Minnesota Weasel is more or less common throughout the state.

Authentic records are given for Johnson County by Nutting (1892), for Palo Alto County by Ruthven and Wood (1912), for Marshall County by Gabrielson (1921), for Dickinson County by Stephens (1922), and for Sac County by Spurrell (1917).

George G. Goodwin, Assistant Curator, writes that a specimen of this subspecies from Webb, in Clay County, is contained in the American

Museum of Natural History (letter, 1936).

Published records of specimens: Johnson Co., Nutting (1892), 1, University of Iowa Museum; Palo Alto Co., Ruthven and Wood (1912), 1, Museum of Zoology at the University of Michigan; Sac Co., Spurrell (1917), 2, Smith collection at Sac City.

COMMON MINK

Mustela vison mink (Peale and Beauvois)

1796. Mustela mink Peale and Beauvois, Catal. Peale's Mus., Philadelphia, p. 39.
Type Locality: Maryland.

1871. Putorius lutreolus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 183.

1883. Putorius lutreolus Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Putorius lutreolus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Lutreola vison Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 217.

1921. Putorius vison lutreocephalus Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 149.

The status of the Common Mink in Iowa is undetermined. This subspecies probably ranges throughout the state, increasing in numbers towards the south.

A specimen of this subspecies from Iowa City, in Johnson County, is contained in the American Museum of Natural History (Goodwin, letter, 1936). This is the only definite record of this mink in Iowa.

MISSISSIPPI VALLEY MINK

Mustela vison letifora Hollister

1913. Mustela vison letifora Hollister, Proc. U. S. Nat. Mus., vol. 44, p. 475.
Type Locality: Elk River, Sherburne County, Minnesota.

The status of the Mississippi Valley Mink is undetermined for Iowa. The range probably extends throughout the state, increasing in numbers toward the north. Surber (1932) gives the range of this subspecies in Minnesota to the Iowa border.

The only published record for letifora in Iowa is offered by Spurrell (1917), who bases the record on a specimen in the Smith collection.

Specimens examined:

Decatur County, Leon; Nos. 39a, 40a and 47a (skulls); Iowa State College collection.

Boone County, Luther; No. 36a; Iowa State College collection.

(All of the specimens in the Iowa State College collection were examined by A. H. Howell of the U. S. Biological Survey.)

CANADA OTTER

Lutra canadensis canadensis (Schreber)

1776. Lutra canadensis Schreber, Saugethiere, pl. 126b.
Type Locality: Eastern Canada.

1871. Lutra canadensis Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 183.

1883. Lutra canadensis Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Lutra canadensis Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Lutra canadensis Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 217.

The Canada Otter was formerly found throughout the state wherever a supply of food in the form of fish was to be found. Through persistent trapping the otter became uncommon at an early date. Galland (1921) observed that the animal was becoming scarce. The reports received by Allen (1871, p. 183) during the summer of 1867 led him to write: "Said to be common on the Raccoon rivers, and generally more or less so throughout the State." The otter is considered rare by Osborn (1890), and was thought to have been extinct about 1890 by Van Hyning and Pellett (1910).

The otter is well-known as a wanderer and continued to appear at irregular intervals throughout the state until about 1913. The specimen contained in the Iowa State College Museum was taken at Cambridge, in Story County, in the spring in 1881.

Van Hyning (1913, p. 312) quotes from a letter by George H. Berry, of Cedar Rapids, April 8, 1913: "Two otter went up the Cedar River on the ice in December and were tracked in the snow for nearly eight miles. Dr. Bailey of Coe College is negotiating for the skin of one caught the past winter, near Albia." Van Hyning (1913, p. 311) fails to name the writer of a letter composed at Knoxville, in Marion County, February 24, 1913: "M. W. Conwell, a local furrier, displays the skin of a large

otter recently trapped on the Des Moines River, near Harvey, ten miles east of Knoxville. The pelt is in fine condition from the standpoint of the furrier, and is 5 feet 9 inches from tip to tip. The animal was trapped by John Morgan. About a week ago one of Mr. Morgan's traps was sprung by an otter which gnawed its leg off and escaped." This information probably came from G. K. Cherrie who collected mammals in the vicinity of Knoxville, especially during the last of the nineteenth century. The latter information probably represents the last published record of the occurrence of the otter in Iowa.

Specimen examined:

Story County, Cambridge; 1; Iowa State College Museum.

PRAIRIE SPOTTED SKUNK

Spilogale interrupta (Rafinesque)

1820. Mephitis interrupta Rafinesque, Annals of Nature, vol. 1, p. 3. Type Locality: Upper Missouri

1910. Spilogale interrupta Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 217.

1912. Spilogale interrupta Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 205.

1921. Spilogale interrupta Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 149.

The Prairie Spotted Skunk is a southern species which has extended its range over Iowa in recent years.

The first authentic record of this skunk's presence in Iowa was made

at Grinnell in 1870 by Parker (1870). Spurrell (1917) writes that early settlers in Sac County reported trapping the first spotted skunk in 1858. It was obviously scarce in the state as late as 1892, since it is not listed by such early writers as Allen (1871), Goding (1883) and Osborn (1890 and 1892). It was so scarce that Nutting (1892), unaware of Parker's publication, records this species as "New to the State" from specimens taken at Iowa City, in Johnson County. Spurrell (1917) writes that this species became numerous in Sac County in 1890. In 1902, trappers around Marshalltown, in Marshall County, told Seton (1929, vol. 2) that this species was new and increasing. A fresh specimen of this species taken February 3, 1902 at Marshalltown, in Marshall County, is sketched by Seton (1929, 2:395). By 1907 it was considered quite common in Clay and Palo Alto counties by Ruthven and Wood (1912).

George G. Goodwin, Assistant Curator, writes that there are seven specimens of this species from Iowa City, Johnson County, contained in the American Museum of Natural History (letter, 1936).

Published records of specimens: Tama Co., Gladbrook, A. H. Howell (1906), 1, collection of U. S. Biological Survey; Marshall Co., Marshalltown, A. H. Howell (1906), 2, collection of U. S. Biological Survey.

Specimens examined:

> Decatur County, Leon; No. 42a (skull); Iowa State College collection.

NORTHERN PLAINS SKUNK

Mephitis hudsonica (Richardson)

1829. Mephitis americana var. hudsonica Richardson, Fauna Boreali-Americana, vol. 1, p. 55.
Type Locality: Plains of the Saskatchewan, Canada.

1910. Chincha hudsonica Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 217.

1912. Chincha hudsonica Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

The Northern Plains Skunk is found throughout the northern one-half of the state. The southern limit of the range has not been determined, but it is probably through central Iowa.

The only authentic published record for this species in Iowa is by Ruthven and Wood (1912). This record is based on two specimens taken during the expedition of 1907 in Clay and Palo Alto counties. The specimens are in the Museum of Zoology at the University of Michigan.

Mephitis hudsonica is found throughout Minnesota (Surber, 1932), but it is not listed for Missouri (Bennitt and Nagel, 1937).

ILLINOIS SKUNK

Mephitis mesomelas avia (Bangs)

1898. Mephitis avia Bangs, Proc. Biol. Soc. Washington, vol. 12, p. 32.
Type Locality: San Jose, Mason County, Illinois.

1871. Mephitis mephitica Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 183.

1883. Mephitis mephitica Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Mephitis mephitica Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Chincha mesomeles (sic) avia Van Hyning and Pellett, Proc. Iowa

Acad. Sci., vol. 17, p. 217.

1921. Mephitis mephitis (sic) avia Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The Illinois Skunk is found in southern Iowa with the northern limit of its range undetermined. The northward extension of its range is probably greater in the east than it is in the west. It is found throughout Missouri by Bennitt and Nagel (1937), but there is no record for Minnesota.

Spurrell (1917) lists Mephitis mesomelas avia for Sac County, but the reference is open to question. An authentic record of avia is based on a skull taken at Ames and referred to this subspecies by A. H. Howell of the U. S. Biological Survey.

Published records of museum specimens: Delaware Co., A. H. Howell (1901), 1, collection of U. S. Biological Survey.

Specimens examined:

Story County, Ames; No. 38a (skull); Iowa State College collection.

COMMON BADGER

Taxidea taxus taxus (Schreber)

1778. Ursus taxus Schreber, Saugthiere, vol. 3, p. 520.
Type Locality: Labrador and Hudson Bay.

1871. Taxidea americana Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 183.

1883. Taxidea Americana (sic) Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Taxidea americana Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Taxidea americana Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 217.

1912. Taxidea taxus Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

The Common Badger is found in all Iowa. Badger populations exhibit a fluctuation, the cause of which would make an interesting and valuable determination.

In 1883, it was recorded as rare (Goding, 1883); in 1905 Osborn (1905) believed that there were few if any remaining, and by 1910 it was thought to be extinct (Van Hyning and Pellett, 1910). It was later found not to have become extinct (Van Hyning, 1913).

Opinion indicates that this mammal has shown a recent increase in numbers. Trapping records obtained from biennial and unpublished reports of the Iowa Conservation Commission appear to bear this out.

Season	Number Taken	Average Value
1930-31	75	Undetermined (Unpublished report, 1931)
1931-32	56	Undetermined (Unpublished report, 1932)
1932-33	17	$4.00 (Iowa, 1934, p. 27)
1933-34	227	$3.75 (Iowa, 1934, p. 27)
1934-35	207	$5.50 (Iowa, 1936, p. 37)
1935-36	611	$5.12 (Iowa, 1936, p. 37)

Specimen examined:

"S. E. Iowa"; museum No. 1; Iowa State College Museum.

Family Canidae

NORTHERN PLAINS RED FOX

Vulpes regalis Merriam

1900. Vulpes regalis Merriam, Proc. Washington Acad. Sci., vol. 2, p. 672.
Type Locality: Elk River, Sherburn Co., Minnesota.

1871. Vulpes vulgaris Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 182 (Not Desmarest).

1883. Vulpes vulgaris Goding, Iowa State Agr. Soc. (1882), p. 330. (Not Desmarest).

1890. Vulpes vulgaris Osborn, Proc. Iowa Acad. Sci., vol. 1, p.42. (Not Desmarest).

1910. Vulpes pennsylvanicus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 217 (Not Desmarest).

1921. Vulpes fulvus fulvus Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148. (Not Desmarest).

The Northern Plains Red Fox is found throughout all Iowa, being most numerous over its ancient range in northern part of the state.

All published records of the red fox in Iowa refer to fulva. Only one record can be so construed as to appear to have been substantiated by a museum skin. C. C. Nutting (1895, p. 43) refers to this specimen, taken in Johnson County, as "The red fox, Vulpes velox...." and represents it as being in the University of Iowa Museum. Nutting explains that this fox was becoming more numerous in southeastern Iowa at the time, 1894; hence, there is no doubt but that the correct reference is to regalis and not to velox, a plains species with no

authentic standing in Iowa. Nutting's specimen is not in the University of Iowa Museum (Dill, letter, 1937).

In 1867, the red fox was numerous from Wall Lake northward and occasional south of that point (Allen, 1871). The original range was gradually extended southward. Pellett writes that it first appeared at Atlantic, in Cass County, during the 1900's (letter, 1936). Despite persistent hunting and year around open season, the red fox continues to maintain its population throughout the state and to increase its numbers in the extended range over southern Iowa.

During this investigation specimens were taken at Estherville, in Emmett County, at Missouri Valley, in Harrison County, and at Leon, in Decatur County. All of these specimens have been referred to regalis by A. H. Howell.

Specimens examined:

Emmett County, Estherville; No. 45a (skull); Iowa State College collection.

Harrison County, Missouri Valley; No. 47a (skin and skull); Iowa State College collection.

Decatur County, Leon; Nos. 48a, 49a, 50a, 52a, 53a, 54a, 55a, 56a, 57a, 58a, 59a and 60a (skulls); Iowa State College and U. S. Biological Survey collections.

WISCONSIN GRAY FOX

Urocyon cinereoargenteus ocythus Bangs

1899. Urocyon cinereoargenteus ocythus Bangs, Proc. New England Zool. Club, vol. 1, p. 43.
Type Locality: Platteville, Grant County, Wisconsin.

1871. Vulpes virginianus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 182.

1883. Vulpes virginianus Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Urocyon virginianus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Urocyon cinereoargenteus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 218.

The Wiscon Gray Fox is found over northeastern Iowa. The limits of the range have not been determined.

The gray fox was believed "Frequent, but not especially numerous" by Allen (1871, p. 43). It is listed for Sac County by Spurrell (1917) on questionable report. Its presence there is extremely doubtful.

Specimens examined:

"Iowa"; museum No. 1; Iowa State College Museum.

NORTHERN COYOTE

Canis latrans Say

1823. Canis latrans Say, Long's Exped. Rocky Mts., vol. 1, p. 168. Type Locality: Blair, Washington County, Nebraska.

1871. Canis latrans Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 181.

1883. Canis latrans Goding, Iowa State Agr. Soc. (1882), p. 329.

1890. Chrysocyon latrans Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Canis latrans Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 218.

1912. Canis latrans Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

1921. Canis latrans latrans (sic) Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The Northern Coyote appears to maintain occasional and irregular appearance throughout the state, showing a natural inclination for the less settled areas. As early as 1867 it was considered as formerly numerous (Allen, 1871). The coyote has been given a more or less occasional rating by the more recent writers.

During this investigation specimens were taken at Missouri Valley, in Harrison County, and at Leon, in Decatur County. These specimens were referred to latrans by A. H. Howell of the U. S. Biological Survey.

Published records of museum specimens: Linn Co., Cory (1912), 2 skulls, Coe College collection.

Specimens examined:

Decatur County, Leon; No. 46a (skull); Iowa State College collection.

Harrison County, Missouri Valley; No. 44a (skull); Iowa State College collection.

TIMBER WOLF

Canis nubilus Say

1823. Canis nubilus Say, Long's Exped. Rocky Mts., vol. 1, p. 169. Type Locality: Blair, Washington County, Nebraska.

1871. Canis lupus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 181.

1883. Canis occidentalis Goding, Iowa State Agr. Soc. (1882), p. 329.

1890. Canis lupus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 41.

1910. Canis nubilus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 218.

The Timber Wolf is of irregular occurrence throughout the state, appearing most frequently in the southeastern counties.

Allen (1871, p. 181) indicates that this species was common until about the middle of the last century, since he writes: "---common less than 20 years since, they are now scarce...." In the 1890's, the wolf was thought to be increasing in northern Iowa (Nutting, 1893 and 1895). Spurrell (1917), writing for Sac County, received information that the last wolf had been killed in 1868. Mr. P. Johann, Conservation Officer, reported two wolves as passing through Emmett County during the winter of 1935-36. Newspaper articles in respect to wolves appear from time to time, but a satisfactory tracing has not been effected as yet. Frequently such references are to latrans.

The recent survey of Bennitt and Nagel (1937, p. 26) in Missouri found nubilus to be "Common to rare in all counties, more numerous in southern Missouri."

Family Felidae

ROCKY MOUNTAIN COUGAR

Felis oregonensis hippolestes (Merriam)

1897. Felis hippolestes Merriam, Proc. Biol. Soc. Washington, vol. II, p. 219.
Type Locality: Wind River Mountains, Fremont County, Wyoming.

1871. Felis concolor Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 181.

1883. Felis concolor Goding, Iowa State Agr. Soc. (1882), p. 329.

1890. Felis concolor Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 41.

1910. Felis concolor Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 218.

The Rocky Mountain Cougar formerly appeared throughout the wooded parts of the state.

The species is included in all the former lists of Iowa mammals from Allen (1871) to Van Hyning and Pellett (1910). These records are made largely upon known distribution and report. In 1840 Galland (1921, p. 500) writes: "The Panther is rarely seen in the country; their skins are to be found among the Indians, but I have not seen the animal alive in the country." A rather colorful report is offered by Van Hyning (1913, p. 312), but he fails to give the source of information. He quotes: "After a furious battle this morning (April 13, 1909) with a mountain lion, which sprung upon him while he was hunting on an island in Rush Lake, Walter Strauss of this place (Ocheyedon, Osceola County) finally killed the animal with a well directed shot from his Winchester. The animal weighed 160 pounds - measuring six feet from the nose to tip of tail." Swenk (1915, p. 853) writes for Nebraska: "Formerly common, now rare or extinct northwestwardly." It was reported to have been seen in Illinois as late as 1905 (Cory, 1912).

CANADA LYNX

Lynx canadensis canadensis Kerr

1792. Lynx canadensis Kerr, Anim. Kigd., vol. 1, systematic catalogue inserted between pages 32 and 33 (description, p. 157). Type Locality: Eastern Canada

1883. Lynx canadensis Goding, Iowa State Agr. Soc. (1882), p. 329.

1890. Lynx canadensis Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 44.

1910. Lynx canadensis Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 218.

The Canada Lynx entered northern Iowa as a straggler before and during the early days of settlement. The species has been included in all state lists since Goding (1883). It is found in an early list of the mammals for Cook County, Illinois (Kennicott, 1855).

Swenk (1915, p. 353), writing for Nebraska, considers it "Very rare northwardly, probably extinct in the state." Records of canadensis, as made by untrained observers, are almost inseparable from those for rufus. Spurrell (1917) provides one of the more accurate records, since he was informed by professional trappers in Sac County of three taken in 1869 and one in 1875. On the authority of Spurrell's inclusion, it is believed safe to accept the statement of Mosher (1882) who writes: "A few Canada lynxes are here, but they are rare; four have been killed here since I came." There is a record of this lynx being taken on the island south of Muscatine (Van Hyning, 1913). The specimen is said to have been the size of a wolf. A small wolf is at least twice the weight

of the largest lynx. Increased doubt is found for the record since it is so far off the natural range. The specimen, which was supposed to have been prepared by a taxidermist at Iowa City, has not been located.

WILDCAT

Lynx rufus rufus (Schreber)

1777. *Felis rufa* Schreber, Saugthiere, pl. 109b.
Type Locality: New York.

1871. *Lynx rufus* Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 181.

1883. *Lynx rufus* Goding, Iowa State Agr. Soc. (1882), p. 329.

1890. *Lynx rufus* Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 41.

1910. *Lynx rufus* Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 218.

The Wildcat was formerly found throughout Iowa, and it is barely possible that stragglers may still appear in the bluffs along the Mississippi River in the northeastern part of the state.

Osborn (1905) considered this species near extinction. For Nebraska, Swenk (1915, p. 853) included it as "Rare eastwardly." Stephens (1922) writes that specimens, taken here and there throughout northwestern Iowa, are probably this animal. In Minnesota "It is more common than is generally known along the Mississippi River bluffs where it finds congenial habitat among the cliffs." (Surber, 1932, p. 56).

A specimen, bearing the locality record "Iowa" and without the date

of capture, is contained in the Iowa State College Museum.

Specimens examined:

"Iowa"; museum No. 1; Iowa State College Museum.

ORDER 5. RODENTIA
Family Sciuridae

SOUTHERN WOODCHUCK

Marmota monax monax (Linnaeus)

1758. [Mus] monax Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 60. Type Locality: Maryland.

1871. Arctomys monax Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 190.

1883. Arctomys monax Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Arctomys monax Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Arctomys monax Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1918. Marmota monax monax Stoner, Iowa Geol. Survey, Bul. No. 5, p. 45.

1921. Marmota monax monax Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The Southern Woodchuck, formerly south of Iowa, is now found throughout the state. The northward extension of its range was most rapid along wooded streams; hence, the earliest observations of this mammal were made along the larger streams of the Missouri and Mississippi River systems. Perhaps this is what led Stoner (1918, p. 45), being most familiar with the Mississippi Valley, to write: "The woodchuck is a common rodent throughout the eastern half of the state, but is seldom met with in the

extreme western counties."

Spurrell (1917) was informed that the woodchuck was present in Sac County when the settlers first came in 1854. While Allen (1871) further south but higher on the Missouri-Mississippi watershed did not record the species as late as 1867. A reported observation of the animal in Davis County was accepted by Allen during the same investigation. It was not until the 1900's that the woodchuck appeared at Atlantic, Cass County, (Pellett, letter, 1936). Spurrell (1917) saw an increased number of these animals in Sac County after 1905. It was not observed by Ruthven and Wood (1912) in Clay and Palo Alto counties during the expedition of 1907. In about 1916 the first woodchucks appeared in the lake region of Dickinson County (Stephens, 1922). Unfortunately, the specimen from Ames, Story County, in the Iowa State College, bears no date of capture.

Published records of museum specimens: Sac Co., Wall Lake, A. H. Howell (1915), 1, University of Iowa Museum; Johnson Co., A. H. Howell (1915), 8, University of Iowa Museum.

Specimens examined:

Story County, Ames; museum No. 34; Iowa State College Museum.

THIRTEEN-STRIPED GROUND SQUIRREL

Citellus tridecimlineatus tridecimlineatus (Mitchill)

1821. Sciurus tridecim-lineatus Mitchill, Med. Repos., N. S. vol. 6 (21), p. 248.
Type Locality: Central Minnesota.

1871. Spermophilus tridecim-lineatus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 189.

1883. Spermophilus tridecim-lineatus Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Spermophilus tridecimlineatus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Spermophilus tridecimlineatus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1912. Citellus tridecemlineatus (sic) Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 203.

1918. Citellus tridecimlineatus tridecimlineatus Stoner, Iowa Geol. Survey, Bul. No. 5, p. 29.

1921. Citellus tridecimlineatus tridecimlineatus Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 147.

The Thirteen-striped Ground Squirrel is a common resident throughout the open grasslands of the state. The species is most abundant in the northern part of the state.

A specimen of this species from Luxemburg, Dubuque County, is contained in the Field Museum of Natural History (Simms, letter, 1936). This is more than likely the specimen to which Cory (1912, p. 144) refers. Surber has a specimen from Fairport, Muscatine County, in his private collection (letter, 1936). George G. Goodwin, Assistant Curator, writes of 17 specimens from Webb, Clay County, in the American Museum of Natural History (letter, 1936).

Published records of museum specimens: Clay and Palo Alto counties, Ruthven and Wood (1912), 27, Museum of Zoology, University of Michigan.

Specimens examined:

Story County, Ames; 3; Iowa State College Museum.

FRANKLIN GROUND SQUIRREL

Citellus franklini (Sabine)

1822. Arctomys franklini Sabine, Trans. Linn. Soc., vol. 13, p. 587. Type Locality: Vicinity of Carlton House, Saskatchewan, Canada.

1871. Spermophilus franklini Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 189.

1883. Spermophilus franklini Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Spermophilus franklini Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Spermophilus franklini Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1912. Citellus franklini Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

1918. Arctomys franklinii (sic) Stoner, Iowa Geol. Survey, Bul. No. 5, p. 36.

1921. Citellus franklini Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 147.

The Franklin Ground Squirrel is found throughout the state, originally inhabiting the open prairie and later spreading over the areas opened by agriculture. The irregular occurrence of this species in a given locality may be due to migration. It is not nearly so numerous as tridecimlineatus.

Surber (letter, 1936), Superintendent of Fish Propagation, Minnesota Department of Conservation, writes that a specimen of this species from Fairport, Muscatine County, is contained in his private collection. There

are four specimens from Webb, Clay County, and one from Iowa City, Johnson County, in the American Museum of Natural History (Goodwin, letter, 1936).

Published records of museum specimens: Clay Co., Ruthven and Wood (1912), 10, Museum of Zoology, University of Michigan.

GRAY EASTERN CHIPMUNK

Tamias striatus griseus Mearns

1891. Tamias striatus griseus Mearns, Bull. Amer. Mus. Nat. Hist., vol. 3, p. 231.
Type Locality: Fort Snelling, Hennepin County, Minnesota.

1871. Tamias striatus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 189.

1883. Tamias striatus Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Tamias striatus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Tamias striatus griseus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1918. Tamias striatus griseus Stoner, Iowa Geol. Survey, Bul. No. 5, p. 27.

1921. Tamias striatus griseus Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 147.

The Gray Eastern Chipmunk is rather generally distributed throughout the wooded parts of the state. Early reports indicate that it is not nearly so numerous as it was at the time of settlement. At present it appears to be locally common in eastern and southeastern Iowa and decreasing in numbers wherever the wooded cover is being removed.

A specimen from Cedar Rapids, Linn County, in the Coe College Museum

was examined by Cory (1912) and referred to griseus. There are no specimens of Tamias in the Coe College Museum at the present time (Stiles, letter, 1937).

Published records of museum skins: Story Co., Ames, A. H. Howell (1929), 1, collection of the U. S. Biological Survey; Des Moines Co., Burlington, A. H. Howell (1929), 29, collection of the U. S. Biological Survey; Linn Co., Cedar Rapids, A. H. Howell (1929), 1, Field Museum of Natural History; Floyd Co., Charles City, A. H. Howell (1929), 1, University of Iowa Museum; Henry Co., Hillsboro and Wayland, A. H. Howell (1929), 2, University of Iowa Museum.

SOUTHERN RED SQUIRREL

Sciurus hudsonicus loquax Bangs

1896. Sciurus hudsonicus loquax Bangs, Proc. Biol. Soc. Washington, vol. 10, p. 161.
Type Locality: Liberty Hill, New London County, Connecticut.

1871. Sciurus hudsonius Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 188.

1883. Sciurus hudsonius Goding, Iowa State Agr. Soc. (1882), p. 331.

1910. Sciurus hudsonicus loquax Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1918. Sciurus hudsonicus loquax Stoner, Iowa Geol. Survey, Bul. No. 5, p. 25.

The exact range of the Southern Red Squirrel in Iowa is undetermined, but is probably over the southern half of the state. It is locally common,

especially toward the southeast.

Cory (1912) refers a specimen taken at Knoxville, Marion County, to this subspecies. No doubt this is the Knoxville specimen now reposing in the Field Museum of Natural History (Simms, letter, 1936). The records of Stoner (1918) and others are questionable since no attempt is made to distinguish between loquax and minnesota.

MINNESOTA RED SQUIRREL

Sciurus hudsonicus minnesota Allen

1899. Sciurus hudsonicus minnesota Allen, Amer. Nat., vol. 33, p. 640. Type Locality: Fort Snelling, Hennepin County, Minnesota.

The range of the Minnesota Red Squirrel is undetermined in Iowa, but is probably over the northern half of the state. It is of local abundance, increasing in numbers towards the northeast.

The only authentic record for minnesota in Iowa is based on a specimen taken at Charles City, Floyd County (Stoner, 1917). Identification of this specimen was made by A. H. Howell of the U. S. Biological Survey. Stephens' (1922) record of loquax for Dickinson County is probably a misidentification of minnesota. The records of loquax for Dickinson and Cerro Gordo counties by Stoner (1918) are questionable; Stoner's loquax record for Charles City, Floyd County, was correctly referred to minnesota by Howell as has already been mentioned.

NORTHERN GRAY SQUIRREL

Sciurus carolinensis leucotis (Gapper)

1830. Sciurus leucotis Gapper, Zool. Journ., vol. 5, p. 206
Type Locality: Between York and Lake Simcoe, Ontario Canada.

1871. Sciurus carolinensis Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 188.

1883. Sciurus carolinensis Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Sciurus carolinensis Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Sciurus carolinensis Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1918. Sciurus carolinensis leucotis Stoner, Iowa Geol. Survey, Bul. No. 5, p. 22.

The geographic distribution of the Northern Gray Squirrel in Iowa is not well known, but is probably confined to the eastern part of the state, especially to the north. The occurrence of this squirrel is irregular in a given locality due to mass migrations. Many gray squirrels were seen about Clinton, Clinton County, in the '60's, but none were present by 1915 (Spurrell, 1915). The Northern Gray Squirrel is reported as abundant in northeastern Iowa by Stoner (1918), but such large populations are not present today. Surber (1932, p. 61) writes for Minnesota: "This squirrel is common in the oak and hard maple forests along the eastern border of the state from the Iowa line north into Pine County...."

WESTERN FOX SQUIRREL

Sciurus niger rufiventer (Geoffroy)

1803. Sciurus rufiventer Geoffroy, Catal. Mamm. Mus. Nat. Hist., Paris, p. 176.
Type Locality: Mississippi Valley, exact locality unknown.

1871. Sciurus ludovicianus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 188.

1883. Sciurus vulpinus Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Sciurus cinereus Var. ludovicianus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Sciurus ludovicianus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1918. Sciurus niger rufiventer Stoner, Iowa Geol. Survey, Bul. No. 5, p. 19.

1921. Sciurus niger rufiventer Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 147.

The Western Fox Squirrel is common throughout the wooded parts of the state, even spreading to isolated farm groves on the prairie.

Cory (1912) refers five specimens from Knoxville, Marion County, to this subspecies. The Knoxville specimens examined by Cory are contained in the Field Museum of Natural History (Simms, letter, 1936). Mr. George G. Goodwin, Assistant Curator, writes of two specimens from Webb, Clay County, referable to rufiventer in the American Museum of Natural History (letter, 1936). A specimen, No. 23a, taken at Pacific Junction, Mills County, and another, No. 19a, taken at Duncan, Hancock County, have been identified as this subspecies by A. H. Howell.

Specimens examined:

Story County, Ames; museum No. 1; Iowa State College Museum

Mills County, Pacific Junction; No. 23a; collection of the U. S. Biological Survey.

Hancock County, Duncan; No. 19a; collection of the U. S. Biological Survey.

SMALL EASTERN FLYING SQUIRREL

Glaucomys volans volans (Linnaeus)

1758. [Mus] volans Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 63. Type Locality: Virginia.

1871. Pteromys volucella Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 189.

1883. Pteromys volucellus Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Sciuropterus volans Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Sciuropterus volans Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

1918. Glaucomys volans volans Stoner, Iowa Geol. Survey, Bul. No. 5, p. 17.

1921. Glaucomys volans volans Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 147.

The Small Eastern Flying Squirrel is found locally throughout the wooded parts of the state, excepting the northwestern corner where it appears to be rare or absent.

There is a specimen of this squirrel from Iowa City, Johnson County, in the American Museum of Natural History (Goodwin, letter, 1936); and another from Knoxville, Marion County, in the Field Museum of Natural History (Simms, letter, 1936).

Published records of museum specimens: Henry Co., Hillsboro, A. H. Howell (1918), 2, collection of the U. S. Biological Survey; Johnson Co., Iowa City, A. H. Howell (1918), 1, private collection of Dayton Stoner; Union Co., Thayer, A. H. Howell (1918), 2, private collection of Dayton Stoner; Marion Co., Knoxville, A. H. Howell (1918), 3, collection of the Biological Survey.

Specimens examined:

Story County, Ames; 1; Iowa State College collection.

Family Geomyidae

SHAW POCKET GOPHER

Geomys bursarius (Shaw)

1800. Mus bursarius Shaw, Trans. Linn. Soc., vol. 5, p. 227. Type Locality: Not known, somewhere in the upper Mississippi Valley.

1871. Geomys bursarius Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 190.

1883. Geomys bursarius Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Geomys bursarius Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Geomys bursarius Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 212.

1912. Geomys bursarius Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

1918. Geomys bursarius bursarius (sic) Stoner, Iowa Geol. Survey, Bul. No. 5, p. 108.

1921. Geomys bursarius bursarius (sic) Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

Numerous "gopher mounds" throughout the grasslands of the state indicate the wide distribution of the Shaw Pocket Gopher. This mammal was not so numerous at the time of settlement as it is today. Early settlers informed Spurrell (1917) that the gopher was not so common during the early days in Sac County. Cultivation and general opening up of the land has provided for increased numbers by extension of the natural range.

Specimens examined:

Story County, Ames; museum No. 1; Iowa State College Museum.

Family Heteromyidae

DUSKY POCKET MOUSE

Perognathus flavescens perniger Osgood

1904. Perognathus flavescens perniger Osgood, Proc. Biol. Soc. Washington, vol. 17, p. 127.
Type Locality: Vermilion, Clay County, South Dakota.

This represents the first record of the Dusky Pocket Mouse, Perognathus flavescens perniger, for Iowa. Locality records are not sufficient to permit determination of the range, but it will probably prove to be over the western two-thirds of the state. Two specimens of P. f. perniger are in the Iowa State College collection, one from Guthrie Center, Guthrie County, and the other from Oakland, Pottawattamie County. These specimens were referred to perniger by A. H. Howell.

Specimens examined:

Guthrie County, Guthrie Center; 1; Iowa State College collection.

Pottawattamie County, Oakland; 1; Iowa State College collection.

Family Castoridae

MISSOURI RIVER BEAVER

Castor canadensis missouriensis Bailey

1919. Castor canadensis missouriensis Bailey, Journ. Mamm., vol. 1, p. 32.
Type Locality: Apple Creek, 7 miles east of Bismarck, Burleigh County, North Dakota.

The Missouri River Beaver is found irregularly over the Missouri River watershed, especially in the northwestern part of the state. Food and drainage problems frequently check the permanency of its establishment in given regions; nevertheless, its numbers are stable to increasing.

References to canadensis typicus for Iowa cannot be presented as misidentifications of missouriensis, for it is possible that the beaver inhabiting extreme northeastern Iowa today and formerly over the eastern part of the state may be of the type form.

History indicates that the beaver became scarce or extinct in the state during the '90's. Osborn (1890) considered them rare; Van Hyning and Pellett (1910, p. 214) believed them to have "---become extinct sometime in the nineties." There is no doubt but that the beaver has re-established itself in respect to numbers, but its once complete extinction is subject to question.

Two specimens taken in December, 1936, at Lakeview, Sac County, were

referred to this subspecies by A. H. Howell. An unidentified specimen of beaver, taken on February 12, 1887, in Cherokee County, is contained in the Milwaukee Public Museum (Gromme, letter, 1936).

Specimens examined:

Sac County, Lakeview; Nos. 43a and 25a (skulls); Iowa State College collection.

Family Cricetidae

SHORT-EARED GRASSHOPPER MOUSE

Onychomys leucogaster breviauritus Hollister

1913. Onychomys leucogaster breviauritus Hollister, Proc. Biol. Soc. Washington, vol. 26, p. 216.
Type Locality: Fort Reno, Canadian County, Oklahoma.

The only record of the Short-eared Grasshopped Mouse for Iowa is based on a specimen taken in Dickinson County and contained in the Museum of Zoology at the University of Michigan (Dice, 1924, p. 66). The occurrence of this mouse may prove to be accidental with continued collection. Dice's record is considerably off the known range, since Hollister (1914, p. 453) writes: "Eastern Nebraska, eastern and south-central Kansas, and middle Oklahoma. From Neligh, Nebraska, and Fort Riley and Neosha Falls, Kansas, west and south to Kinsley, Kansas, and to Woodward and Fort Reno, Oklahoma. Entirely within the Carolinean and Austroriparian faunas of the Austral region." Swenk (1915, p. 852) considers it "Uncommon eastwardly" in Nebraska.

PRAIRIE HARVEST MOUSE

Reithrodontomys megalotis dychei (Allen)

1895. Reithrodontomys dychei Allen, Bull. Amer. Mus. Nat. Hist., vol. 7, p. 120.
Type Locality: Lawrence, Douglas County, Kansas.

1890. Ochetodon humilis Osborn, Proc. Iowa Acad Sci., vol. 1, p. 43.

1912. Reithrodontomys griseus, Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204. (Not Bailey).

1918. Reithrodontomys megalotis dychei Stoner, Iowa Geol. Survey, Bul. No. 5, p. 76.

1922. Reithrodontomys megalotis dychei Stephens, Okoboji Protective Assoc., Bul. No. 18, p. 55.

The Prairie Harvest Mouse is found throughout the grasslands of the state.

A map by A. H. Howell (1914) presents the known range of this mouse in Iowa as everywhere southwest of a line from the northwest corner of the state southeast to the vicinity of Waterloo and south to Keokuk. However, there is no doubt but that this speciew is found in suitable locations over the remainder of the state. Surber (1932) reports two specimens from Homer, Winona County, on the Mississippi River in Minnesota. There are also four specimens from further south on the Mississippi River at Fairport, Muscatine County, Iowa, in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation (letter, 1936). Pellett (1912) finds this mouse common near Atlantic, Cass County.

Five specimens referable to dychei from Atlantic, Cass County, are contained in the Milwaukee Public Museum (Gromme, letter, 1936). Stoner (1918) claims specimens from Iowa City, Wall Lake, Atlantic, Ottumwa, Tama, Logan and Jefferson but fails to give their location. Two specimens from Ames, Story County, were referred to dychei by A. H. Howell.

Published records of museum specimens: Cass Co., Atlantic, A. H. Howell (1914), 2, collection of the U. S. Biological Survey; Henry Co., Hillsboro, A. H. Howell (1914), 2, collection of the U. S. Biological Survey; Palo Alto Co., A. H. Howell (1914), 1, Museum of Zoology at the University of Michigan.

Specimens examined:

Story County, Ames; 2; Iowa State College collection.

BAIRD WHITE-FOOTED MOUSE

Peromyscus maniculatus bairdi (Hoy and Kennicott)

1857. Mus bairdii Hoy and Kennicott, in Kennicott, Agricultural Report, U. S. Patent Office, 1856, p. 92.
Type Locality: Bloomington, McLean County, Illinois.

1871. Hesperomys michiganensis Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 193.

1883. Hesperomys michiganensis Goding, Iowa State Agr. Soc. (1882), p. 330

1890. Hesperomys michiganensis Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Peromyscus maniculatus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 213.

1912. Peromyscus maniculatus bairdii Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

1918. Peromyscus maniculatus bairdi Stoner, Iowa Geol. Survey, Bul. No. 5, p. 73.

The Baird White-footed Mouse is common throughout the state.

Stoner (1918) claims specimens from Corning, Jefferson, Thayer, Wall Lake, Ottumwa, Melvin, Waukon, Rodman, Ocheyedan, Logan and Homestead, but fails to give their location.

Four specimens from Fairport, Muscatine County, are contained in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation (letter, 1936). George G. Goodwin, Assistant Curator, writes of 20 specimens from Iowa City, Johnson County, in the American Museum of Natural History (letter, 1936). There is a single specimen from Knoxville, Marion County, in the Field Museum of Natural History (Simms, letter, 1936).

Published records of museum specimens: Clay Co., Osgood (1909), 5, Museum of Zoology at the University of Michigan; Palo Alto Co., Osgood (1909), 4, Museum of Zoology at the University of Michigan; Marion Co., Knoxville, Osgood (1909), 14, collection of the U. S. Biological Survey.

Specimens examined:

Boone County, Jordan; No. 33a; Iowa State College collection.

Decatur County, High Point; 2; Iowa State College collection.

Lee County, Fort Madison; No. 20a; Iowa State College collection.

Muscatine County, Fairport; 1; Museum of Natural History, University of Minnesota.

(All specimens of bairdi in the Iowa State College collection were

identified by A. H. Howell of the U. S. Biological Survey.)

NORTHERN WHITE-FOOTED MOUSE

Peromyscus leucopus noveboracensis (Fischer)

1829. [Mus sylvaticus] δ noveboracensis Fischer, Synopsis Mammalium, p. 318.
Type Locality: New York.

1871. Hesperomys leucopus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 192.

1883. Hesperomys leucopsus (sic) Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Hesperomys leucopus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Peromyscus leucopus noveboracensis Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 213.

1918. Peromyscus leucopus noveboracensis Stoner, Iowa Geol. Survey, Bul. No. 5, p. 69.

1921. Peromyscus leucopus noveboracensis Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The Northern White-footed Mouse is common throughout all Iowa.

Stoner (1918) claims specimens from Wayland, Hayfield, Burlington, Fairport, Thayer, Wall Lake, Iowa City, Charles City, Homestead and Newton, but fails to give their location.

There are seven specimens of noveboracensis from Fairport, Muscatine County, in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation (letter, 1936). The Field Museum of Natural History contains one specimen from Knoxville,

Marion County, and three from Iowa City, Johnson County (Simms, letter, 1936).

Published records of museum specimens: Des Moines Co., Burlington, Osgood (1909), 57, collection of the U. S. Biological Survey; Pottawattamie Co., Council Bluffs, Osgood (1909), 5, collection of the U. S. Biological Survey; Marion Co., Knoxville, Osgood (1909), 10, collection of the U. S. Biological Survey; Dallas Co., Osgood (1909), 1, collection of the U. S. Biological Survey.

Specimens examined:

Decatur County, High Point; 3; Woodland; 3; Iowa State College collection.

Hamilton County, Jewell; Nos. 16a, 15a, 8a, 4a, 5a, and 1a; Iowa State College collection.

Story County, Ames; No. 35a, No. 32a, plus 4; Iowa State College collection.

(All specimens of noveboracensis in the Iowa State College collection were identified by A. H. Howell.)

GOSS LEMMING MOUSE

Synaptomys cooperi gossii (Coues)

1877. Arvicola (Synaptomys) gossii Coues, Monogr. N. Amer. Rodentia, p. 235 (published as a synonym of Synaptomys cooperi, but name stated to apply to Kansas specimens, description p. 236.) Type Locality: Neosho Falls, Woodson County, Kansas.

1890. Synaptomys cooperi Osborn, Proc. Iowa Acad Sci., vol. 1, p. 43.

1918. Synaptomys cooperi gossii Stoner, Iowa Geol. Survey, Bul. No. 5, p. 106.

1922. Synaptomys cooperi gossii Stephens, Okoboji Protective Assoc., Bul. No. 18, p. 56.

The range of the Goss Lemming Mouse in Iowa has not been completely determined, but it appears to be confined to the wet meadows and marsh edges of the southern half of the state. In respect to the scarcity of material, A. B. Howell (1927, p. 3) writes: "Until more specimens are obtained, further progress in the proper understanding of the relationship of several races can hardly be expected."

Specimens are recorded from Logan, Harrison County, and from Fairport, Muscatine County, by Stoner (1918). The specimen from Fairport is in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation (letter, 1936).

Published records of museum specimens: Henry Co., Hillsboro, A. B. Howell (1927), 1, collection of the U. S. Biological Survey; Linn Co., Marion, A. B. Howell (1927), 1, Museum of Comparative Zoology; Marion Co., Knoxville, A. B. Howell, 1, collection of the Biological Survey.

PENNSYLVANIA MEADOW MOUSE

Microtus pennsylvanicus pennsylvanicus (Ord)

1815. Mus pennsylvanica Ord, Guthrie's Geography, 2d Amer. ed., vol. 2, p. 292.
Type Locality: Meadows below Philadelphia, Pennsylvania.

1871. Arvicola riparius Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 193.

1883. Arvicola riparia (sic) Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Arvicola riparius Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Microtus pennsylvanicus Van Hyning and Pellett, vol. 17, p. 213.

1918. Microtus pennsylvanicus pennsylvanicus Stoner, Iowa Geol. Survey, Bul. No. 5, p. 78.

1921. Microtus pennsylvanicus pennsylvanicus Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The Pennsylvania Meadow Mouse is found in all parts of Iowa, especially in wet meadows and marsh borders.

Stoner (1918) claims specimens from Melvin, Thayer, Atlantic, Jefferson, Waukon, Charles City and Iowa City, but fails to give their location. Authentic records are given for Marshall County by Gabrielson (1921) and for Sac County by Spurrell (1917).

A single specimen from Fairport, Muscatine County, is contained in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation (letter, 1936). George G. Goodwin, Assistant Curator, writes of three specimens from Webb, Clay County, in the American Museum of Natural History (letter, 1936). There are three specimens from Luxemburg, Dubuque County, and two from Knoxville, Marion County, in the Field Museum of Natural History (Simms, letter, 1936). Specimens from Clay County are contained in the Museum of Zoology, University of Michigan (Burt, letter, 1937).

Published records of museum specimens: Marion Co., Knoxville, Bailey (1900), 2, Field Museum of Natural History.

Specimens examined:

Dickinson County, Arnold's Park; No. 11a; Okoboji; No. 10a; Iowa State College collection.

Palo Alto County, Ruthven; No. 9a; Iowa State College collection.

Story County, Ames; No. 6a, plus 1; Iowa State College collection.

Muscatine County, Fairport; 7; Museum of Natural History, University of Minnesota.

(All specimens in the Iowa State College collection were referred to M. p. pennsylvanicus by A. H. Howell.)

PRAIRIE MEADOW MOUSE

Microtus ochrogaster (Wagner)

1842. Hypudaeus ochrogaster Wagner, Schreber's Saugthiere, Suppl., vol. 3, p. 592.
Type Locality: America

1871. Arvicola austera Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 194.

1883. Arvicola austera Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Arvicola austerus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Microtus austerus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 213.

1918. Microtus ochrogaster ochrogaster Stoner, Iowa Geol. Survey, Bul. No. 5, p. 87.

1921. Microtus ochrogaster ochrogaster Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The Prairie Meadow Mouse is found throughout the state, exhibiting a preference for a drier habitat than that chosen by pennsylvanicus.

Stoner (1918) claims specimens from Newton, Ottumwa, Monticello, Wall Lake, Waukon, Logan, Corning, Melvin, Atlantic and Homestead, but fails to give their location. There are 20 specimens from Iowa City, Johnson County, in the American Museum of Natural History (Goodwin, letter, 1936). The Field Museum of Natural History contains three specimens from Knoxville, Marion County (Simms, letter, 1936). Gabrielson (1921) gives an authentic record for Marshall County.

Published records of Museum specimens: Jefferson Co., Fairfield, Bailey (1900), 1, collection of the U. S. Biological Survey; Marion Co., Knoxville, 93, collection of the U. S. Biological Survey.

Specimens examined:

Story County, Ames; No. 26a, 27a, 28a, 30a, 31a, plus 5; Iowa State College collection.

Decatur County, Woodland; 3; Iowa State College collection.

(All specimens in the Iowa State College collection were identified by A. H. Howell.)

WOODLAND PINE MOUSE

Pitymys nemoralis (Bailey)

1898. Microtus pinetorum nemoralis Bailey, Proc. Biol. Soc. Washington, vol. 12, p. 89.
Type Locality: Stilwell, Adair County, Oklahoma.

1871. Arvicola pinetorum Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 194.

1910. Microtus nemoralis Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 213.

1918. Microtus pinetorum nemoralis Stoner, Iowa Geol. Survey, Bul. No. 5, p. 91.

The Woodland Pine Mouse is found in the southern one-half of Iowa, exhibiting a preference for brushy fence rows and woodland borders.

Stoner (1918) claims specimens from Thayer, Ottumwa and Iowa City, but fails to give their location. A single specimen of nemoralis is contained in the private collection of Thaddeus Surber, Superintendent of Fish Propagation, Minnesota Department of Conservation (letter, 1936).

Published records of museum specimens: Pottawattamie Co., Council Bluffs, Bailey (1900), 1, collection of the U. S. Biological Survey.

COMMON MUSKRAT

Ondatra zibethica zibethica Linnaeus

1766. [Castor] zibethicus Linnaeus, Syst. Nat., ed. 12, vol. 1, p. 79. Type Locality: Eastern Canada.

1871. Fiber zibethicus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 194.

1883. Fiber zibethicus Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Fiber zibethicus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Fiber zibethicus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 213.

1912. Fiber zibethicus Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

1918. Fiber zibethicus zibethicus Stoner, Iowa Geol. Survey, Bul. 5, p. 96.

1921. Fiber zibethicus zibethicus Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The determined range of the Common Muskrat for Iowa is everywhere east of a line from Minnesota south through Hayfield, Hancock County, and continuing south through Ames, Story County, southeast through Ottumwa, Wapello County, to Missouri. Undoubtedly this western limit of distribution will be extended with continued collection, but the available material does not warrant such alteration at present.

The record given by Cory (1912) for Mayfield is a misspelling of Hayfield, Hancock County. These six specimens are in the Field Museum of Natural History (Simms, letter, 1936). Gabrielson (1921) offers an authentic record for Marshall County. The Fiber zibethicus Ondatra z. zibethica of Ruthven and Wood (1912) for Clay and Palo Alto counties is doubtful, and the records of Spurrell (1917) for Sac County and of Stephens (1922) for Dickinson County are also subject to question for all of these records fall within what appears to be cinnamomina range (Hollister, 1911). Stoner (1918) offers no definite records.

Published records of museum specimens: Des Moines Co., Burlington, Hollister (1911), 1, collection of the U. S. Biological Survey.

Specimens examined:

Story County, Ames; No. 37a; collection of the U. S. Biological Survey.

Hamilton County, Jewell; 6; collection of the U. S. Biological Survey.

(All of the above specimens were referred to O. z. zibethica by A. H. Howell.)

GREAT PLAINS MUSKRAT

Ondatra zibethica cinnamomina (Hollister)

1910. Fiber zibethicus cinnamominus Hollister, Proc. Biol. Soc. Washington, vol. 23, p. 125.
Type Locality: Wakeeney, Trego County, Kansas.

1918. Fiber zibethicus cinnamominus Stoner, Iowa Geol. Survey, Bul. 5, p. 105.

The Great Plains Muskrat is found in western Iowa, but the exact limits of distribution have not been determined. Stoner (1918) includes cinnamomina on the basis of Hollister's (1911) record for Knoxville, Marion County. Stoner (1918, p. 106) writes: "The writer has not obtained specimens of this muskrat, but collectors and trappers should be on the lookout for it is western Iowa where the area of intergradation occurs."

Published records of museum specimens: Marion Co., Knoxville, Hollister (1911), 1, collection of the U. S. Biological Survey.

HOUSE MOUSE

Mus musculus musculus Linnaeus

1758. [Mus] musculus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 62.
Type Locality: Upsala, Sweden.

1883. Mus musculus Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Mus musculus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Mus musculus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1912. Mus musculus Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

1918. Mus musculus Stoner, Iowa Geol. Survey, Bul. No. 5, p. 52.

1921. Mus musculus Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The House Mouse is common about buildings, showing a tendency to apread to the fields over the state.

NORWAY RAT

Rattus norvegicus (Erxleben)

1777. [Mus] norvegicus Erxleben, Syst. Regni. Anim., vol. 1, p. 381. Type Locality: Norway.

1883. Mus decumanus Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Mus decumanus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Mus decumanus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1918. Rattus norvegicus Stoner, Iowa Geol. Survey, Bul. No. 5, p. 54.

1921. Rattus norvegicus Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The Norway Rat is common about buildings in all parts of the state. This rat was introduced to eastern United States in 1775, and upon establishment spread to all parts of the country in shipments. Early settlers informed Spurrell (1917) that the first barn rat came to Sac

County in a box of goods from New York in 1858. This rat was killed, and the species did not appear again until about 1868.

Family Zapodidae

PRAIRIE JUMPING MOUSE

Zapus hudsonius campestris Preble

1899. Zapus hudsonius campestris Preble, North Amer. Fauna No. 15, p. 20.
Type Locality: Bear Lodge Mountains, Crook County, Wyoming.

1871. Jaculus hudsonius Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 192.

1883. Jaculus hudsonius Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Zapus hudsonius Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Zapus hudsonius campestris Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 212.

1918. Zapus hudsonius campestris Stoner, Iowa Geol. Survey, Bul. No. 5, p. 124.

The Prairie Jumping Mouse is irregularly distributed throughout the state, showing a tendency towards local abundance.

The specimens contained in the Iowa State College collection represent the first authentic records of campestris for the state. They were referred to this subspecies by A. H. Howell.

Specimens examined:

Palo Alto County, Ruthven; 1; Iowa State College collection.

Story County, Ames; 1; Iowa State College collection.

Ida County, Arthur; 1; Iowa State College collection.

ORDER 6. LAGOMORPHA
Family Leporidae

WHITE-TAILED JACK RABBIT

Lepus townsendii campanius Hollister

1837. Lepus campestris Bachman, Journ. Acad. Nat. Sci., Philadelphia, vol. 7, p. 349.
Type Locality: Plains of the Saskatchewan, Canada.

1890. Lepus campestris Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Lepus campestris Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 212.

1912. Lepus campestris Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

1918. Lepus townsendii campanius Stoner, Iowa Geol. Survey, Bul. No. 5, p. 131.

1921. Lepus townsendi (sic) campanius Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The White-tailed Jack Rabbit is found throughout the state, being most numerous in the northern counties.

This species has extended its range over Iowa from the northwest. Early settlers in Sac County informed Spurrell (1917) that the jack rabbit was not present upon their arrival in 1854 and did not appear until 1868. It was considered occasional in Dickinson County by Mosher (1882). Evidently it had not been observed very frequently by the summer of 1867 since it does not appear in Allen's (1871) list. The species

increased noticeably in the northern counties during the '90's (Osborn, 1892, and Nutting, 1895). Its appearance in Clinton County is noted for 1905 (Spurrell, 1917). The extension to the northeastern part of the state was a little slower since it did not appear there until about 1911 (Stoner, 1917).

Specimens examined:

Story County, Ames: Museum No. 9 and No. 49; Iowa State College Museum.

MEARNS COTTONTAIL

Sylvilagus floridanus mearnsi (Allen)

1894. Lepus sylvaticus mearnsii Allen, Bull. Amer. Mus. Nat. Hist., vol. 6, p. 171.
Type Locality: Fort Snelling, Hennepin County, Minnesota.

1871. Lepus sylvaticus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 194.

1883. Lepus sylvaticus Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Lepus sylvaticus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Lepus floridanus mearnsi Van Hyning and Pellett, Proc. Iowa Sci., vol. 17, p. 212.

1912. Sylvilagus floridanus mearnsi Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

1918. Sylvilagus floridanus mearnsi Stoner, Iowa Geol. Survey, Bul. No. 5, p. 134.

1921. Sylvilagus floridanus mearnsi Gabrielson, Proc. Iowa Acad. Sci., vol. 28, p. 148.

The Mearns Cottontail is found throughout Iowa. It is believed

that the cottontail was not very numerous before the land had been opened up by settlement. Land use, as effected by the early settlers, provided a balance of food and cover more suitable to cottontails, and they became more numerous in the vicinity of civilization. Galland (1840, p. 500) writes: "----found in the settled parts of the country," and Allen (1871, p. 194) considers them "Common about the groves and thickets."

The Field Museum of Natural History contains 5 specimens of mearnsi from Knoxville, Marion County (Simms, letter, 1936). George G. Goodwin, Assistant Curator, writes of 34 specimens from Iowa City, Johnson County, in the American Museum (letter, 1936).

Published records of museum specimens: Palo Alto Co., Nelson (1909), 8, Museum of Zoology, University of Michigan; Woodbury Co., Sioux City, Nelson (1909), 1, collection of the U. S. Biological Survey; Van Buren Co., Nelson (1909), 1, collection of the U. S. Biological Survey; Des Moines Co., Burlington, Nelson (1909), 2, collection of the U. S. Biological Survey; Polk Co., Fort Des Moines, Nelson (1909), 1, collection of the U. S. Biological Survey; Johnson Co., Iowa City, Nelson (1909), 3, collection of the U. S. Biological Survey.

Specimens examined:

Story County, Ames; 1; Iowa State College collection.

Decatur County, Leon; 1; Iowa State College collection.

Appanoose County; 1; Iowa State College collection.

Pottawattamie County; 1; Iowa State College collection.

Fremont County, Sidney; 23a; Iowa State College collection.

(All of the above specimens were referred to mearnsi by A. H. Howell.)

ORDER 7. ARTIODACTYLA

Family Cervidae

AMERICAN ELK

Cervus canadensis canadensis (Erxleben)

1777. [Cervus elaphus] canadensis Erxleben, Syst. Regni Anim., vol. 1, p. 305.
Type Locality: Eastern Canada.

1871. Cervus canadensis Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 184.

1883. Cervus Canadensis (sic) Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Cervus canadensis Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Cervus canadensis Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 216.

The American Elk was formerly found throughout Iowa, especially common in the northwestern part of the state.

Land use made the extermination of this mammal inevitable, but the blizzard of 1856 did much to hasten the day when elk could no longer be found in the state. Thousands of these mammals were slaughtered while trapped in the deep snow left by the blizzard.

Spurrell (1917) was informed by a hunter that no elk had been seen in Sac County since a herd of 40 passed near Wall Lake in October, 1869.

This record for Sac County appears to be the published record for the most recent occurrence of elk in the state. No doubt a few stragglers remained, for the 14th General Assembly extended the closed season in 1872, and in 1898 they were given complete protection by the 27th General Assembly (Bennett, 1926).

PLAINS WHITE-TAILED DEER

Odocoileus virginianus macrourus (Rafinesque)

1817. Cervus (misspelled Corvus) macrourus Rafinesque, American Monthly Magazine, vol. 1, p. 436.
Type Locality: Plains of Kansas River, Upper Mississippi.

1871. Cervus virginianus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 186.

1883. Cervus virginianus Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Cervus virginianus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Odocoileus americanus macrouris (sic) Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 216.

The Plains White-tailed Deer was formerly found throughout the wooded parts of the state. Great numbers of them were utilized by the early settlers for food and clothing. Galland (1921) writes that hundreds were killed annually. Opening up of the forest provided additional food; hence, the deer populations were temporarily increased or stabilized, but with more intensive land use they were greatly reduced in numbers.

The effect of civilization on the deer populations was seen earliest in the eastern part of the state. Fultz (1899) reported them last seen

in Muscatine County about 1851. The greatest deer slaughter occurred shortly after the blizzard of 1856. A descriptive picture of the occasion is given by Brainard (1894, p. 393), who writes: "Another lamentable effect of the ice-cap of that winter was the cruel and wanton destruction of wild game. Prior to that season the groves bordering the streams in northern Iowa were well stocked with deer, elk, hare, foxes, wolves, etc.. The ice drove these out from sheltering timber to seek food about the farmers' stacks. Men and boys with dogs and guns made savage onslaught upon these. The sharp feet of the larger game cut through the ice and rendered their escape impossible. In some instances they were run down by men on foot, with no other weapon than the family butcher knife, which was all too effective."

In 1856, the 6th General Assembly passed the first law for the protection of deer; the law consisted of a closed season from February 1 to July 15. The numbers of deer may have increased under protection for in 1868 the 12th General Assembly extended the open season by one month (Bennett, 1926). Allen (1871) considered them more or less common in southwest Iowa during the summer of 1867. The closed season on deer was again lengthened by the 14th General Assembly in 1872 (Bennett, 1926). Mr. V. E. Harris of Oakland informed the writer that his uncle, C. G. Johnson, killed a deer 4 miles southeast of McPaul, Fremont County, in September, 1881, and that the event was considered unusual because deer were thought to have been exterminated in the county. Mosher (1882) reports few remaining in Dickinson County in 1882. Spurrell (1917) writes

of one killed in Sac County in 1890. Complete protection was given deer by action of the 27th General Assembly in 1898 (Bennett, 1926).

The race of white-tailed deer living in Iowa today has not been determined. Perhaps they may be partially identified by investigation of the location from which the seed stock was secured. Three distinct herds of captive deer are responsible for the reestablishment of this mammal in Iowa. Mr. William B. Cuppy, of Avoca, Pottawattamie County, possessed one of these herds. Hon. Frank Beymer, editor of the Avoca Journal-Herald, informed the writer that Cuppy purchased his deer somewhere in Nebraska. Geographic identification would refer Cuppy's deer, supposedly taken in Nebraska, to Odocoileus v. macrourus. One night in 1894 the gate to the deer park was opened and all of the deer escaped to the timber on Cuppy's farm. At that time there were 35 in the herd. Twelve years later, during a drive, Beymer estimated their number at 200. Today, withstanding heavy poaching, they are probably no more numerous, but have separated into several herds. On April 15, 1937, Taylor Huston, Iowa Conservation Commission, informed the writer that about 17 deer were to be found north of Hancock, Pottawattamie County, and about 75 northeast of Avoca, and about 46 in the vicinity of Irwin, Shelby County.

A second herd at the Ledges State Park descends from deer formerly kept at the game farm of the old Fish and Game Commission. Mr. Taylor Huston, of the Iowa State Conservation Commission, informed the writer that two of these deer were purchased in Minnesota and that the others were probably taken from those running wild near Avoca. The deer from

Minnesota are, by geographic identification, Odocoileus v. borealis. A number of deer from the Ledges herd have escaped and are living in the timber along the Des Moines River.

A third herd is located near Keota, Washington County. These deer are known as the Singmaster herd and represent escaped animals which were probably purchased in Nebraska. On April 15, 1937, Taylor Histon, Iowa Conservation Commission, informed the writer that there were about 60 individuals known to be living in that vicinity.

Deer from the three herds discussed have been planted in various parts of the state, and this accounts for those appearing in unusual places.

None of the deer in Iowa have been collected for accurate identification of the subspecies, but it appears that the predominate race is Odocoileus v. macroura, which is the race formerly found over the state.

Family Bovidae

PLAINS BISON

Bison bison bison (Linnaeus)

1758. [Bos] bison Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 72. Type Locality: Mexico.

1871. Bos americanus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 186.

1883. Bos Americanus (sic) Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Bos americanus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

1910. Bison bison Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 216.

The Plains Bison was formerly common over northwest Iowa, straggling into other parts of the state. The location of bison remains by county shows the former range of this mammal very nicely (Fig. 1.). The work by Pammel (1930) dismisses all doubt as to the former occurrence of this mammal in Iowa.

All of the early reports contain accounts of the bison. Kearny observed 5000 at Elk Lake in Clay County on July 11, 1820 (Peterson, 1931, p. 302). By 1840 they were occasional on the headwaters of the Des Moines and Iowa Rivers (Galland, 1921). Early settlers in Sac County considered bison as stragglers after their arrival in 1854. (Spurrell, 1917). Allen (1871) believed it to have been nearly exterminated by the summer of 1867.

Pammel (1930) writes of a bison killed near Lost Island Lake, Palo Alto County, in 1858. One was killed in Boyer Township, Harrison County, in 1864 (Pugsley, 1911). "The Biographical and Historical Record of Greene and Carroll Counties of Iowa" contains a record of a bison shot on June 7, 1864 in Carroll County according to Spurrell (1917).

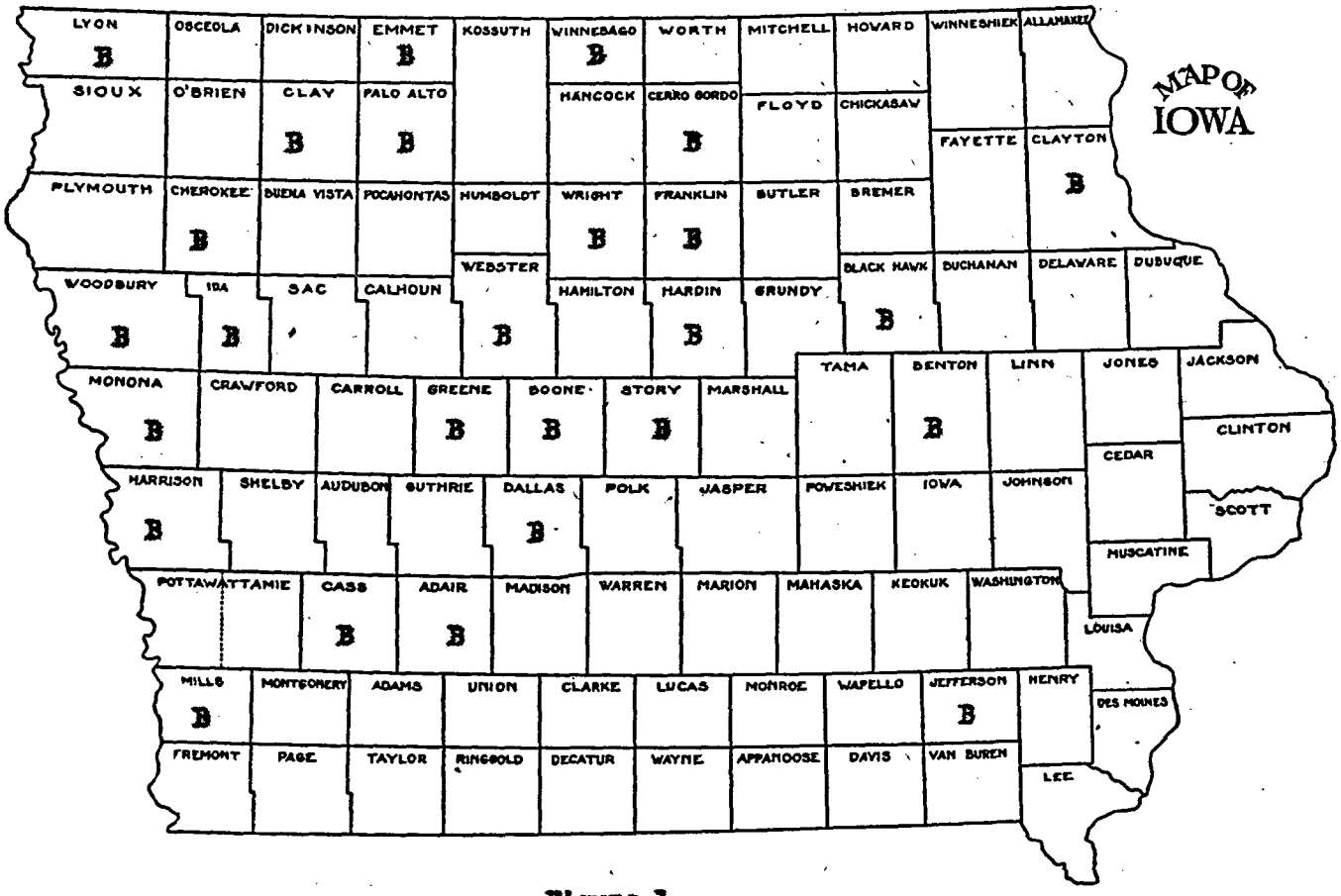

Figure 1.

Counties in which buffalo remains have been found.

These records are given on authority of Pammel (1930).

MAMMALS OF HYPOTHETICAL OCCURRENCE

ORDER 3. CHIROPTERA
Family Vespertilionidae

LITTLE GRAY BAT

Myotis grisescens Howell

1909. Myotis grisescens Howell, Proc. Biol. Soc. Washington, vol. 22, p. 46.
Type Locality: Nickajack Cave, near Shellmound, Marion County, Tennessee.

With increased investigation this bat may be taken in southern Iowa. Anthony (1928, p. 54) writes that this species is "Found in Tennessee, Missouri and Indiana."

GEORGIAN BAT

Pipestrellus subflavus subflavus (F. Cuvier)

1832. V[espertilio] subflavus F. Cuvier, Nouv. Ann. Mus. Nat. Paris, vol. 1, p. 17.
Type Locality: Eastern United States.

1871. Scotophilus georgianus Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187.

1910. Pipestrellus subflavus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 215.

There is small doubt but that the Georgian Bat occurs in eastern Iowa, but existing evidence for including this species is not satisfactory.

Allen (1871) includes this bat on known distribution; Van Hyning and Pellett (1910) fail to offer comment. Miller (1897, p. 91) writes that this subspecies is found in the "Austral zones and casually parts of Transition zone in Eastern United States, from the Atlantic Coast west to Iowa and eastern and southern Texas."

RAFINESQUE BAT

Nycticeius humeralis (Rafinesque)

1818. Vespertilio humeralis Rafinesque, Amer. Monthly Mag., vol, 3, p. 445.
Type Locality: Kentucky.

1871. Nycticejus crepuscularis Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187.

1890. Atalapha crepuscularis Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

Satisfactory evidence for including the Rafinesque Bat is lacking. It is listed on known distribution by Allen (1871), and Osborn (1890 and 1892) does not offer suitable support for his records.

ORDER 4. CARNIVORA
Family Mustelidae

AMERICAN MARTEN

Martes americana americana Turton

1806. [Mustela] americanus Turton, Linnaeus, System of Nature, vol. 1, p. 60.
Type Locality: Eastern North America.

1883. Mustela Americana (sic) Goding, Iowa State Agr. Soc. (1882), p.330.

1890. Mustela martes Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

The American Marten may have entered northeastern Iowa as a straggler many years ago. This mammal, among the first to retreat before civilization, probably sought its preferred home in the heavy pine and spruce forests at an early date.

The former range, as presented by Seton (1929, vol. 2), passes very near the northeast corner of Iowa. A marten skeleton in the Chicago Academy of Sciences, which is said to have been taken in northern Illinois, is recorded by Cory (1912). This mammal is recorded by Kennicott (1855) for Cook County, Illinois, without comment.

The records for the marten in Iowa by Goding (1883) and Osborn (1890 and 1892) are considered doubtful.

FISHER

Martes pennanti pennanti (Erxleben)

1777. [Mustela] pennanti Erxleben, Sust. Regni Anim., vol. 1, p. 470. Type Locality: Eastern Canada.

1883. Mustela pennanti Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Mustela pennantii (sic) Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

The Fisher, like the American Marten, may have entered northeastern Iowa as a straggler before and during the days of early settlement.

Van Hyning (1913, p. 311) quotes John G. Smith from the Register

and Farmer, Algona: "Plenty of coons and some fishers ran wild in the timber." The species is believed "rare" by Goding (1883). Spurrell (1917) writes of a hunter who supposedly followed fisher tracks in Calhoun County during the late '50's, and of a fur buyer who traded for two fisher skins somewhere north of Sac County. All of these records are subject to question, principally because a description of the animal is not given.

It is of significance that such writers as J. A. Allen (1871), Osborn (1890), Galland (1921) and Mosher (1882) fail to mention this mammal.

NEW YORK WEASEL

Mustela noveboracensis noveboracensis (Emmons)

1840. Putorius noveboracensis Emmons, Report Quad. Massachusetts, p. 45.
Type Locality: Southern New York.

This weasel probably enters eastern Iowa and needs only to be collected. Cory (1912, p. 367) issues the following statement in discussing the range of this subspecies: "In the West its range extends at least to the Mississippi River in western Illinois."

COMMON WOLVERINE

Gulo luscus (Linnaeus)

1766. [Ursus] luscus Linnaeus, Syst. Nat., ed. 12, vol. 1, p. 71
Type Locality: Hudson Bay.

1883. Gulo luscus Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Gulo luscus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

The Common Wolverine probably entered northeastern Iowa as a straggler until the middle of the last century.

This species is given a hypothetical rating by Osborn (1890), but in a later publication (1892, p. 5) considers it "Rare or extinct." The wolverine is listed without comment by Goding (1883). It is of significance that Galland (1840) fails to mention this mammal.

A suitable record for the wolverine in 1882 as far south as Knox County, in Indiana, has been reported by Lyon (1936).

LONG-TAILED TEXAS SKUNK

Mephitis mesomelas varians (Gray)

1837. Mephitis varians Gray, Charlesworth's Mag. Nat. Hist., vol. 14, p. 581.
Type Locality: Texas.

Mephitis mesomelas varians may be recorded for western and southwestern Iowa. It ranges throughout "Southern and western Texas, eastern New Mexico, and adjacent parts of Mexico; north into Oklahoma, Colorado, Kansas and Nebraska" (Howell, 1901, p. 31). In Nebraska, Swenk (1915, p. 854) considers it "Common over the state."

Family Canidae

SWIFT FOX

Vulpes velox velox (Say)

1823. [Canis] velox Say, Long's Exped. Rocky Mts., vol. 1, p. 487.
Type Locality: South Platte River, Colorado.

1871. Vulpes velox Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 182.

Vulpes v. velox, a plains species, may have been found in northwestern Iowa before and during the time of settlement. The species is included by Allen (1871) on description. The early settlers in Sac County describe a fox which appears referable to velox (Spurrell, 1917). It is given a hypothetical rating by Osborn (1892). The specimen referred to Vulpes velox by Nutting (1895) is a misidentification of regalis.

ORDER 5. RODENTIA
Family Sciuridae

RUFESCENT WOODCHUCK

Marmota monax rufescens Howell

1914. Marmota monax rufescens Howell, Proc. Biol. Soc. Washington, vol. 27, p. 13.
Type Locality: Elk River, Sherburne County, Minnesota.

The Rufescent Woodchuck may straggle into the northern tier of counties in Iowa. The known range includes: "Eastern North Dakota, central and southern Minnesota, Wisconsin, and Michigan, southern Ontario, greater part of New York (including Long Island), and higher parts of western Massachusetts" (A. H. Howell, 1915, p. 25). Surber

(1932) is of the opinion that rufescens intergrades with monax near the Iowa-Minnesota state line.

SOUTHERN GRAY SQUIRREL

Sciurus carolinensis carolinensis Gmelin

1788. [Sciurus]carolinensis Gmelin, Syst. Nat., vol. 1, p. 148.
Type Locality: Carolina.

The Southern Gray Squirrel may straggle into southeastern Iowa. Bennitt and Nagel (1937, p. 24) list this squirrel as "Common to rare throughout Missouri but most numerous in the southeastern third of the state."

Family Castoridae

CANADIAN BEAVER

Castor canadensis canadensis Kuhl

1820. Castor canadensis Kuhl, Beitrage z. Zoologie, p. 64.
Type Locality: Hudson Bay.

1871. Castor fiber Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 190.

1883. Castor Canadensis (sic) Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Castor fiber Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1910. Castor canadensis Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1918. Castor canadensis canadensis Stoner, Iowa Geol. Survey, Bul. 5, p. 50.

Beavers existing in northeast Iowa today may prove to be of this subspecies. All former publications on beavers in the state have listed the type form, but none may be considered authentic for lack of description and specimens. It is possible that the beaver mentioned for Tama County by Nutting (1892) and for Linn County by Osborn (1905) were Castor c. canadensis. No doubt this beaver formerly inhabited the wooded streams of eastern Iowa, but suitable evidence of this occurrence is not available.

Family Cricetidae

LITTLE GRAY HARVEST MOUSE

Reithrodontomys albescens griseus (Bailey)

1905. Reithrodontomys griseus Bailey, North Amer. Fauna, No. 25, p. 106. Type Locality: San Antonia, Bexar County, Texas.

The Little Gray Harvest Mouse may appear in the extreme southwest corner of the state, since the range, according to A. H. Howell (1914) extends to southwestern Iowa.

The record of griseus for Palo Alto County by Ruthven and Wood (1912) is a misidentification of Reithrodontomys megalotis dychei.

Family Muridae

BLACK RAT

Rattus rattus rattus (Linnaeus)

1758. [Mus] rattus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 61. Type Locality: Upsala, Sweden.

1883. Mus rattus Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Mus rattus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

1918. Rattus rattus Stoner, Iowa Geol. Survey, Bul. No. 5, p. 68.

There is no authentic record for the Black Rat in Iowa. The species was first listed for the state by Goding (1883) without comment. Osborn (1890) did not know of the species occurring within the state but accepted it on the authority of Jordan. It is probable that these records were largely of opinion and not of fact. Stoner (1918) contributes no additional information.

Family Zapodidae

HUDSON BAY JUMPING MOUSE

Zapus hudsonius hudsonius (Zimmermann)

1780. Dipus hudsonius Zimmermann, Geogr. Gesch., vol. 2, p. 358. Type Locality: Hudson Bay.

1918. Zapus hudsonius hudsonius Stoner, Iowa Geol. Survey, Bul. 5, p. 122.

The Hudson Bay Jumping Mouse may come into eastern Iowa, but no authentic record of its presence has been presented. The status of this mouse, according to Preble (1899, p. 15) is: "As restricted to the present paper, this species is found from the southern shores of Hudson

Bay south to New Jersey, and in the mountains to North Carolina, west to Iowa and Missouri, and northwest to Alaska." Surber (1932) gives the range of this subspecies as over the northern one-half of Minnesota, but records a specimen of campestris from Winona County which shows an approach towards hudsonius.

The specimens represented by Stoner (1918) as being in the University of Iowa Museum cannot be found (Dill, letter, 1937). Stoner also records specimens in the Coe College Museum. In respect to these specimens, Professor K. A. Stiles writes: "We have two specimens labeled Zapus hudsonius, one from Britt, Iowa, collected August 26, 1911, and the other labeled only Iowa." The specimens mentioned by Stoner as having been collected by T. C. Stephens in Dickinson County were not identified beyond the species (Stephens, 1922). Stephens (1922) also writes that the specimen marked "Iowa" in the Coe College Museum was probably collected at the Lakeside Laboratories, Dickinson County.

Family Erethizontidae

CANADA PORCUPINE

Erethizon dorsatum dorsatum (Linnaeus)

1758. [Hystrix] dorsata Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 57. Type Locality: Eastern Canada.

1918. Erithizon (sic) dorsatum dorsatum Stoner, Iowa Geol. Survey, Bul. No. 5, p. 126.

The Canada Porcupine probably straggled into northern Iowa until

the period of settlement; however, no suitable records of its presence have been uncovered. Spurrell (1917) was informed by the settlers in Sac County that this mammal was rare on their arrival in 1854.

All records since the time of settlement must be considered accidental, probably escaped pets. Such a record is offered by T. Van Hyning (1913, p. 311), who writes: "In about 1908 'some hounds in the same section,' Allamakee County, 'were badly stuck up by porcupine quills, which had to be pulled from their mouths. Last summer, on French Creek, Allamakee County, I saw some scrub Hemlocks freshly cut and gnawed by porcupines.' Geo. H. Berry, Cedar Rapids, Iowa, April 8, 1913." Dr. George Hendrickson informs the writer of seeing a porcupine taken at Chariton, Lucas County, during late summer of 1924, but that its captors had not seen evidence of its work in the locality where it was found. The exhibitors of the animal called Hendrickson's attention to an injured forefoot that they assumed to indicate an earlier injury by a trap, and they believed it was an individual from a western state, escaped from a tourist's cage.

The writer observed one that was taken at Murray, Clarke County, during the summer of 1936, and was informed by Taylor Huston, Iowa Conservation Commission, that residents in the community believed the animal to have escaped from a passing tourist's car.

ORDER 7. ARTIODACTYLA

Family Antilocapridae

AMERICAN PRONGHORN

Antilocapra americana americana (Ord)

1815. Antilope americana Ord, Guthrie's Geography, 2d Amer. ed., vol. 2, p. 292 (described on page 308).
Type Locality: Plains and highlands of the Missouri.

There is no definite proof that the American Pronghorn ever existed in Iowa. It probably entered the northwestern part of the state many years ago. Grinnell (1929), after examining the records of the U. S. Biological Survey, is led to believe that the antelope was formerly found in western Iowa.

MISINTERPRETATIONS

ORDER 2. INSECTIVORA
Family Talpidae

STAR-NOSED MOLE

Condylura cristata (Linnaeus)

1758. [Sorex] cristatus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 53. Type Locality: Pennsylvania.

1871. Condylura cristata Allen, Proc. Boston Soc. Nat. Hist., vol. 13, p. 187.

1883. Condylura crestata (sic) Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Condylura cristata Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

The Star-nosed Mole is not included in the present list because, in 67 years that it has received hypothetical rating in Iowa, no proof of its presence has been uncovered, and, in addition, current evidence does much to eliminate the assumption of its occurrence.

The presence of this mole was assumed in the lists of Allen (1871), Osborn (1890), Goding (1883) and Stephens (1922). Without comment, Osborn (1892) failed to list this species in his second list of Iowa mammals.

The western limit of the known range (Jackson, 1915) for this mole enters extreme northeastern Illinois, the eastern margin and northern half of Wisconsin and northeastern Minnesota. At no point does the range come within less than 115 miles of the northeastern corner of Iowa. Surber (1932, p. 43) provides further evidence against the probability of

this mole's occurrence in Iowa, since he writes: "Living in small colonies it is nowhere common except in the extreme northern and northwestern counties, though occasional examples are taken as far south as the central part of the state."

Family Canidae

EASTERN RED FOX

Vulpes fulva (Desmarest)

1820. Canis fulvus Desmarest, Mammalogie, vol. 1, p. 203.
Type Locality: Virginia.

The Eastern Red Fox, Vulpes fulva, is found in all former lists of Iowa mammals, but nowhere is it adequately supported by museum specimens. Undoubtedly the correct reference is to regalis.

ORDER 4. RODENTIA
Family Sciuridae

BLACK-TAILED PRAIRIE DOG

Cynomys ludoviciamus ludovicianus (Ord)

1815. Arctomys ludovicianus Ord, Guthrie's Geography, 2d Amer. ed., vol. 2, p. 292. Description - p. 302.
Type Locality: Upper Missouri River.

1883. Cynomys ludovicianus Goding, Iowa State Agr. Soc. (1882), p. 331.

1910. Cynomys ludovicianus Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 214.

1918. Cynomys ludovicianus ludovicianus Stoner, Iowa Geol. Survey, Bul. 5, p. 40.

There are a few records of the Black-tailed Prairie Dog in Iowa (Hollister, 1916 and Stoner, 1918). All records of prairie dogs in Iowa are treated as observations of escaped pets. Allen (1871) did not find it east of the Missouri River, and Hollister (1916) considers the 97th meridean the eastern limit through Nebraska.

EASTERN CHIPMUNK

Tamias striatus striatus (Linnaeus)

1758. [Sciurus] striatus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 64.
Type Locality: Southeastern United States.

1918. Tamias striatus striatus Stoner, Iowa Geol. Survey, Bul. 5, p. 26.

The inclusion of this subspecies by Stoner (1918) is considered a misidentification. Stoner (1918, p. 26) gives the authority upon which the record was based: "A single specimen in the Coe College Museum, collected at Traer, June 23, 1902, and another at Iowa City are the only two definite locality records which are available." There are no specimens of Tamias sp. in the Coe College Museum (Stiles, letter, 1937). Cory (1912) refers a specimen examined in the Coe College Museum to griseus. The information given is not sufficient to permit tracing of the Iowa City specimen. A statement by A. H. Howell (1929) may account for this misidentification. A. H. Howell (1929, p. 20) referring to T. s. griseus writes: "A large series from Burlington, Iowa, in full summer pelage average a little deeper ochraceous on the sides of the

head and neck, perhaps approaching T. s. striatus." The present range of T. s. striatus is "Southeastern United States, from highlands of North Carolina, South Carolina, Georgia and central Alabama west to the Mississippi River in Kentucky and Tennessee; north to the Ohio Valley in Kentucky." (Howell, 1929, p. 14).

Family Cricetidae

SOUTHERN GOLDEN MOUSE

Peromyscus nuttalli aureolus (Audubon and Bachman)

1841. Mus (Calomys) aureolus Audubon and Bachman, Proc. Acad. Nat. Sci., Philadelphia, vol. 1, p. 98.
Type Locality: "In the oak forests of South Carolina."

1883. Hesperomys nuttalli Goding, Iowa State Agr. Soc. (1882), p. 330.

1890. Hesperomys aureolus Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

The Southern Golden Mouse was listed by Goding (1883) without comment. Osborn (1890, p. 43) accepts Goding's record, but concludes: "Not seen, and I think doubtful." The record of aureolus is not retained in the present list because there are no specimens for the state, and because the known range of this mouse is considerably to the south of Iowa.

BAILEY WOOD RAT

Neotoma floridana baileyi (Merriam)

1894. Neotoma baileyi Merriam, Proc. Biol. Soc. Washington, vol. 9, p. 123.
Type Locality: Valentine, Cherry County, Nebraska.

1883. Neotoma floridana Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. Neotoma floridana Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 43.

The wood rat is listed by Goding (1883) without comment. Osborn (1890, p. 43) writes: "One specimen at Iowa Agricultural College, probably taken at Ames." This specimen cannot be found, and the locality record is doubtful.

DRUMMOND MEADOW MOUSE

Microtus drummondi (Audubon and Bachman)

1854. Arvicola drummondii Audubon and Bachman, Quadr. N. Amer., vol. 3, p. 166.
Type Locality: Alberta, Canada.

1912. Microtus drummondi Ruthven and Wood, Proc. Iowa Acad. Sci., vol. 19, p. 204.

The specimen listed by Ruthven and Wood (1912) has been recently examined by W. H. Burt, Assistant Curator of Mammals of the University of Michigan, and referred to Microtus p. pennsylvanicus (letter, 1937). Occurrence of drummondi in Iowa would be purely accidental, since Bailey (1900, p. 22) represents the range: "From Hudson Bay to the west slope of the Rocky Mountains and Alaska, and from the northern edge of the United States north to Fort Anderson, N. W. T., in Canadian and Hud-

sonian zones."

ORDER 6. LAGOMORPHA
Family Leporidae

MINNESOTA VARYING HARE

Lepus americanus phaeonotus Allen

1899. Lepus americanus phaeonotus Allen, Bull. Amer. Mus. Nat. Hist., vol. 12, p. 11.
Type Locality: Hallock, Kittson County, Minnesota.

1883. Lepus Americanus (sic) Goding, Iowa State Agr. Soc. (1882), p. 331.

1910. Lepus americanus phasonotus (sic) Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 212.

1918. Lepus americanus phaeonotus Stoner, Iowa Geol. Survey, Bul. No. 5, p. 130.

The record by Goding (1883) is given without comment. It is significant that Goding's authority was not accepted by any of the succeeding lists. Van Hyning and Pellett (1910) include the species on the basis of an observation by Pellett. Pellett (letter, 1936) writes: "It is a white rabbit unlike any rabbit common to the state. It was a specimen killed in northern Iowa and in the Museum of Buena Vista College about 1894. Since the record was made a long time later without the specimen for identification, there is a chance that it is mistaken." The inclusion of the species by Stoner (1918) is also based upon this observation by Pellett.

WAGLER'S JACK RABBIT

Lepus callotis Wagler

1830. *Lepus callotis* Wagler, Nat. Syst. der Amphibien, p. 23.
Type Locality: Southern end of Mexican table-land.

1883. *Lepus callotis* Goding, Iowa State Agr. Soc. (1882), p. 331.

1890. *Lepus callotis* Osborn, Proc. Iowa Acad. Sci., vol. 1, p. 42.

This species is first listed by Goding (1883). Osborn (1890, p.42) follows Goding but considers the record "Very doubtful." There is no specimen of this species from the state, and its occurrence here could only be accidental.

GREAT PLAINS JACK RABBIT

Lepus californicus melanotis (Mearns)

1885. *Lepus californicus texianus* True, Proc. U. S. Nat. Mus., vol. 7, (1884), p. 601.
Type Locality: Independence, Montgomery County, Kansas.

1918. *Lepus californicus melanotis* Stoner, Iowa Geol. Survey, Bul. 5, p. 133.

Stoner (1918) includes this jack rabbit on the basis of a specimen taken in Johnson County during the autumn of 1915. This specimen cannot be located, and its occurrence in the state can, at best, only be considered accidental.

ORDER 7. ARTIODACTYLA
Family Cervidae

COMMON MOOSE

Alces americana americana (Clinton)

1822. *Cervus americanus* Clinton Letters on Nat. Hist. and Int. Resources of New York, p. 193.
Type Locality: "Country north of Whitestown," New York.

1910. *Alces americanus* Van Hyning and Pellett, Proc. Iowa Acad. Sci., vol. 17, p. 216.

There is no suitable evidence that the Common Moose was ever present in Iowa. Van Hyning and Pellett (1910, p. 216) write: "The only record known of this species in Iowa is the finding of several teeth in the Boone Mound; supposing they were inhabitants of the territory and were used as food by the pre-historic natives."

LITERATURE CITED

Allen, J. A.
1871. Notes on the Mammals of Iowa. Proc. Boston Soc. Nat. Hist., vol. 13, pp. 178-194.

Anthony, H. E.
1928. Field Book of North American Mammals. G. P. Putnam's Sons, New York-London; pp. iii-xxv, 1-625, plates I-XLVIII, figs. 1-150.

Bailey, Vernon
1900. Revision of American Voles of the Genus Microtus. North American Fauna, No. 17.

Bennett, Henry Arnold
1926. Fish and Game Legislation. Iowa Journal of History and Politics, vol. 24, pp. 335-444.

Bennitt, Rudolf, and Werner O. Nagel
1937. A Survey of the Resident Game and Furbearers of Missouri, Univ. Mo. Studies, vol. 12, No. 2, pp. 1-215.

Brainard, Jno. M.
1894. The Great Blizzard of 1856. Annals of Iowa, vol. 1, pp. 391-397.

Cory, Charles B.
1912. The Mammals of Illinois and Wisconsin. Field Mus. Nat. Hist., pub. 153, Zool. Ser. vol. 11, pp. 1-505.

Dice, L. R.
1924. The Grasshopper Mouse in Iowa. Journ. Mamm., vol. 5, p. 66.

Duffield, G. C.
1903. An Iowa Settler's Homestead. Annals of Iowa, vol. 6, pp. 206-214.

Fultz, W. S.
1899. Life of the Pioneer Farmer. Annals of Iowa, vol. 4, pp. 219-222.

Gabrielson, Ira N.
1921. Notes on the mammals observed in Marshall County. Proc. Iowa Acad. Sci., vol. 28, pp. 147-149.

Galland, Isaac
1921. Galland's Iowa Emigrant. 1840. Reprinted, Annals of Iowa, vol. 12, pp. 481-509.

Goding, W. F.
1883. Catalogue of the Mammals of Iowa, Iowa State Agr. Soc. (1882), pp. 329-331.

Grinnell, George B.
1929. Pronghorn Antelope. Journ. Mamm., vol. 10, pp. 135-141.

Hollister N.
1911. A Systematic Synopsis of the Muskrats. North American Fauna, No. 32.

1914. A Systematic Account of the Grasshopper Mice. Proc. U. S. Nat. Mus., vol. 47, pp. 427-489.

1916. A Systematic Account of the Prairie Dogs. North American Fauna, No. 40.

Howell, A. B.
1927. Revision of the American Lemming Mice. North American Fauna, No. 50.

Howell, A. H.
1901. Revision of the Skunks of the Genus Chincha. North American Fauna, No. 20.

1906. Revision of the Skunks of the Genus Spilogale. North American Fauna, No. 26.

1914. Revision of the American Harvest Mice. North American Fauna, No. 36.

1915. Revision of the American Marmots. North American Fauna, No. 37.

1918. Revision of the American Flying Squirrels. North American Fauna, No. 44.

1929. Revision of the American Chipmunks. North American Fauna, No. 52.

Iowa
1934. Iowa State Fish and Game Commission. Report, 1932-34, pp. 1-54.

1936. Iowa State Conservation Commission. Report, 1934-36 pp. 1-171

Jackson, H. H. T.
1915. A Review of the American Moles. North American Fauna, No. 38.

1928. A Taxonomic Review of the North American Long-tailed Shrews. North American Fauna, No. 51.

Kennicott, Robert
1855. Catalogue of Animals Observed in Cook County, Illinois. Trans. Illinois State Agric. Soc., vol. 1, 1853-54, pp. 577-595.

Lyon, Marcus Ward, Jr.
1936. Mammals of Indiana. Amer. Midland Nat., vol. 17, pp. 1-384.

Merriam, C. Hart
1895. Revision of the Shrews of the American Genera Blarina and Notiosorex. North American Fauna, No. 10.

Miller, Gerrit S., Jr.
1897. Revision of the North American Bats of the Family Vespertilionidae. North American Fauna, No. 13.

1924. List of North American Recent Mammals, 1923. U. S. National Museum, Bul. No. 128.

Mosher, A. A.
1882. The Fauna of Spirit Lake. Forest and Stream, February 23.

Nelson, E. W.
1909. The Rabbits of North America. North American Fauna, No. 29.

Nutting, C. C.
1892. Report of the Committee on State Fauna. Proc. Iowa Acad. Sci., vol. 1, p. 40.

1895. Report of the Committee on State Fauna. Proc. Iowa Acad. Sci., vol. 2, p. 43.

Osborn, Herbert
1890. Catalogue of the Mammals of Iowa. Proc. Iowa Acad. Sci., vol. 1, pp. 41-44.

1892. A Partial Catalogue of the Animals of Iowa.
Iowa Agric. College, pp. 1-39.

1905. The Recently Extinct and Vanishing Animals of Iowa.
Annals of Iowa, vol. 6, pp. 561-570.

Osgood, Wilfred H.
1909. Revision of the Mice of the American Genus Peromyscus.
North American Fauna, No. 28.

Pammel, L. H.
1930. Buffalo in Iowa. Annals of Iowa, vol. 17, pp. 403-434.

Parker, H. W.
1870. The Little Striped Skunk in Central Iowa.
Amer. Nat., vol. 4, p. 376.

Pellett, Frank C.
1912. The Harvest Mouse in Iowa. Proc. Iowa Acad. Sci.,
vol. 19, p. 197.

Peterson, William J.
1931. Kearny in Iowa. Palimpsest, vol. 12, pp. 289-335.

Pugsley, Marcellus
1911. A Plains Adventure of an Iowa Man. Annals of Iowa,
vol. 10, pp. 136-147.

Preble, E. A.
1899. Revision of the Jumping Mice of the Genus Zapus.
North American Fauna, No. 15.

Ruthven, A. G., and N. A. Wood
1912. Notes on a Collection of Mammals from Northwestern Iowa.
Proc. Iowa Acad. Sci., vol. 19, pp. 203-205.

Seton, Ernest Thompson
1929. Lives of Game Animals. Doubleday- Doran and Company, Inc.,
Garden City, New York.

Sherman, Althea R.
1929. Summer Outings of Bats During Fourteen Seasons.
Journ. Mamm., vol. 10, pp. 319-326.

Spurrell, J. A.
1917. An Annotated List of the Mammals of Sac County.
Proc. Iowa Acad. Sci., vol. 24, pp. 273-284.

Stephens, T. C.
1922. Mammals of the Lake Region of Iowa. Okoboji Protective Asso., Bul. No. 18, pp. 47-64.

Stoner, Dayton
1917. Notes on Some Iowa Rodents. Proc. Iowa Acad. Sci., vol. 24, pp. 353-356.

1918. The Rodents of Iowa. Bul. Iowa Geol. Survey., No. 5, pp. 1-172.

Surber, Thaddeus
1932. The Mammals of Minnesota. Minnesota Department of Conservation, Division of Game and Fish.

Swenk, Myron H.
1915. The Birds and Mammals of Nebraska. Nebraska Blue Book, pp. 835-858.

Van Hyning, T.
1913. Additional Mammal Notes. Proc. Iowa Acad. Sci., vol. 20, pp. 311-312.

Van Hyning, T., and Frank C. Pellett
1910. An Annotated Catalogue of the Recent Mammals of Iowa. Proc. Iowa Acad. Sci., vol. 17, pp. 211-218.